

RADIOLOGY

A MONTHLY JOURNAL DEVOTED TO CLINICAL RADIOLOGY AND ALLIED SCIENCES

Vol. 58

JUNE, 1952

No. 6

CONTENTS

THE DISTRIBUTION OF BRONCHI IN GROSS ANOMALIES OF THE RIGHT UPPER LOBE, PARTICULARLY LOBES SUBDIVIDED BY THE AZYGOS VEIN AND THOSE CONTAINING PRE-EPARTERIAL BRONCHI. <i>Edward A. Boyden, Ph.D. (Med. Sc.)</i>	797
TUBERCULOSIS OF THE STOMACH. <i>Walter Gaines, M.D., Howard L. Steinbach, M.D., and Elizabeth Lowenhaupt, M.D.</i>	808
DENTAL ROENTGENOLOGIC MANIFESTATIONS OF SYSTEMIC DISEASE. III. GRANULOMATOUS DISEASE, PAGET'S DISEASE, ACROSCLEROSIS AND OTHERS. <i>Edward C. Stafne, D.D.S.</i>	820
RENAL TUMORS. A ROUND TABLE DISCUSSION. <i>Vincent J. O'Connor, M.D., Abram H. Cannon, M.D., Thomas C. Laipply, M.D., Kenneth Sokol, M.D., and Earl E. Barth, M.D.</i>	830
DETERMINATION OF INDIVIDUAL ENLARGEMENT OF THE VENTRICLES. METHOD BASED ON ANGIOCARDIOGRAPHY IN THE LEFT ANTERIOR OBLIQUE POSITION. <i>Jorge Ceballos, M.D., and Jairo Isaza B., M.D.</i>	844
THE ORGANIZATION OF THE COMPUTOR SYSTEM OF X-RAY CASE PLANNING AT THE LINCOLNSHIRE RADIOTHERAPY CENTRE. <i>Duncan D. Lindsay, M.A.</i>	850
MODIFICATION OF ACUTE IRRADIATION INJURY IN MICE AND GUINEA-PIGS BY BONE MARROW INJECTIONS. <i>Egon Lorenz, Ph.D., Charles Congdon, M.D., and Delta Uphoff, M.S.</i>	863
RADIOPAQUE RENAL CALCULUS IDENTIFIED AS CYSTINE BY X-RAY DIFFRACTION. <i>Jonathan Parsons, M.A.</i>	878
EDITORIAL: RADIATION DOSAGE PLANNING AND DOSAGE CALCULATION. <i>Edith H. Quimby, Sc.D.</i>	881
DENTAL MANIFESTATIONS OF SYSTEMIC DISEASE.	883
ANNOUNCEMENTS AND BOOK REVIEWS.	884
RADIOLOGICAL SOCIETIES: SECRETARIES AND MEETING DATES.	886
ABSTRACTS OF CURRENT LITERATURE.	890
INDEX TO VOLUME 58.	921

RADIOLOGY

A MONTHLY PUBLICATION DEVOTED TO CLINICAL RADIOLOGY AND ALLIED SCIENCES

PUBLISHED BY THE RADIOLOGICAL SOCIETY OF NORTH AMERICA

EDITOR

HOWARD P. DOUB, M.D.

Henry Ford Hospital, Detroit 2, Mich.

ASSOCIATE EDITORS

John D. Camp, M.D.

Hugh F. Hare, M.D.

Laurence L. Robbins, M.D.

PUBLICATION COMMITTEE

George L. Sackett, M.D., Chairman

Leo G. Rigler, M.D.

James W. J. Carpender, M.D.

EDITORIAL ASSISTANTS

Marion B. Crowell, A.B.

Florence E. Roper, A.B.

ADVISORY EDITORIAL BOARD

Richard H. Chamberlain, M.D.

Harold Cummins, Ph.D.

Edith H. Quimby, Sc.D.

Arthur Purdy Stout, M.D.

GENERAL INFORMATION

RADIOLOGY is entered as second class matter at Syracuse, New York, and Easton, Penna., under the Act of August 24, 1912, and accepted November 24, 1934. RADIOLOGY is published by the Radiological Society of North America as its official Journal. Subscription rate \$10.00 per annum. Canadian postage, \$1.00 additional. Foreign postage, \$2.00 additional. Single copies \$2.00 each. All correspondence relative to business matters connected with the Radiological Society of North America and RADIOLOGY, or remittance for non-member subscriptions, should be made payable to the Radiological Society of North America and should be addressed to the BUSINESS MANAGER, DONALD S. CHILDS, M.D., 713 E. GENESEE STREET, SYRACUSE 2, NEW YORK. In requesting change of address, both the old and the new address should be given.

Dues to the Radiological Society of North America include subscription to RADIOLOGY and should be paid to DONALD S. CHILDS, M.D., SECRETARY-TREASURER, 713 E. GENESEE STREET, SYRACUSE 2, N. Y.

The rate for "want" advertisements for insertion in the Classified Section is 8 cents per word, minimum charge \$2.00. Remittance should accompany order. Rates for display advertisements will be furnished upon request.

Inquiries regarding the program for the Annual Meeting of the Society for the current year should be sent to the President.

RADIOLOGY is published under the supervision of the Publication Committee of the Radiological Society of North America, which reserves the right to reject any material submitted for publication, including advertisements. No responsibility is accepted by the Committee or the Editor for the opinions expressed by the contributors, but the right is reserved to introduce such

changes as may be necessary to make the contributions conform to the editorial standards of RADIOLOGY. Correspondence relating to publication of papers should be addressed to the Editor, HOWARD P. DOUB, M.D., HENRY FORD HOSPITAL, DETROIT 2, MICHIGAN.

Original articles will be accepted only with the understanding that they are contributed solely to RADIOLOGY. Articles in foreign languages will be translated if they are acceptable. Manuscripts should be typewritten double-spaced, with wide margins, on good paper, and the original, not a carbon copy, should be submitted. The author's full address should appear on the manuscript. It is advisable that a copy be retained for reference as manuscripts will not be returned.

Illustrations and tables should be kept within reasonable bounds, as the number which can be published without cost to the author is strictly limited. For excess figures and for illustrations in color, estimates will be furnished by the Editor. Photographic prints should be clear and distinct and on glossy paper. Drawings and charts should be in India ink on white or on blue-lined coordinate paper. Blueprints will not reproduce satisfactorily. All photographs and drawings should be numbered, the top should be indicated, and each should be accompanied by a legend with a corresponding number. Authors are requested to indicate on prints made from photomicrographs the different types of cells to which attention is directed, by drawing lines in India ink and writing in the margin. The lines will be reproduced, and the words will be set in type. Attention should be called to points which should be brought out in completed illustrations, by tracings and suitable texts. These instructions should be concise and clear.

As a convenience to contributors to RADIOLOGY who are unable to supply prints for their manuscripts, the Editor can arrange for intermediate prints from roentgenograms.

Contents of RADIOLOGY copyrighted 1952 by The Radiological Society of North America, Inc.

RADIOLOGY

A MONTHLY JOURNAL DEVOTED TO CLINICAL RADIOLOGY AND ALLIED SCIENCES

PUBLISHED BY THE RADIOLOGICAL SOCIETY OF NORTH AMERICA

Vol. 58

JUNE 1952

No. 6

The Distribution of Bronchi in Gross Anomalies of the Right Upper Lobe, Particularly Lobes Subdivided by the Azygos Vein and Those Containing Pre-Eparterial Bronchi¹

EDWARD A. BOYDEN, Ph.D. (Med. Sc.)

Minneapolis, Minn.

I. THE LOBE OF THE AZYGOS VEIN

LOBUS VENAE AZYGOS, a now commonly recognized malformation of the right upper lobe, was first described in 1777 by Heinrich August Wrisberg, Doctor of Medicine and Director of the Anatomical Institute at Göttingen (25). His "observations," made on a cadaver of a three-year-old boy, were especially noteworthy in recognizing that the vena azygos of this specimen presented an aberrant configuration on both sides. The original wood cut (see Fig. 1) shows only the right lung, but the description of the vein of the left side leaves no doubt that the left upper lobe was also cleft: "In order that the progress of the left vena azygos towards the subclavian (i.e., the innominate vein) might be rendered easier, the superior lobe of the left lung was provided with a comparable sulcus or rather incisure such as we have described in connection with the right vena azygos." Although this left-sided anomaly has never been reported again in a dissected specimen, Schmitz-Cliever (22) by employing laminagraphy has identified a left pleural septum in a girl of twenty-two. This de-

scended vertically from the apex of the left lung to enclose a vessel at its lower end. He reports at least two other cases in the literature which he recognizes as authentic.

Wrisberg's account of the right side describes the vena azygos as undergoing "a marked bend in the interval between the heads of the third and fourth ribs," as being "directed toward the interior at less than a right angle," as entering "a sulcus in the superior lobe of the right lung prepared in a manner for transmitting the azygos vein," and as finally "descending into the beginning of the vena cava"; but he failed to note the pleural septum. Discovery of this, according to Collins (12), awaited the publication of Rokitsansky's *Pathologische Anatomie* in 1842-46.²

Eight decades later Velde (24) identified the pleural septum in chest plates. Schmitz-Cliever estimates that the septum occurs in 0.3 per cent of all x-rayed lungs. Clive (11) found it in 0.11 per cent of 30,000 W. A. A. F. recruits. Mäusert, however, in a Dissertation of 1899, quoted by Bluntschli (2) notes that Prof. Boström "found 17 azygos lobes in 1,600 dissections"

¹ From the Department of Anatomy, University of Minnesota. Aided by grants from the Medical Research Funds of the Graduate School. Accepted for publication in January 1952.

² In the Sydenham Society translation of 1852 (21), Rokitsansky writes: "I would direct attention to a hitherto unnoticed persistent duplication of the right pleural sac. It forms at the obtuse apex of the pleura, a fold hanging from above downwards, and from without inwards, including the arch of the vena azygos, and lying in a supernumerary fissure, which divides the upper lobe into two parts."

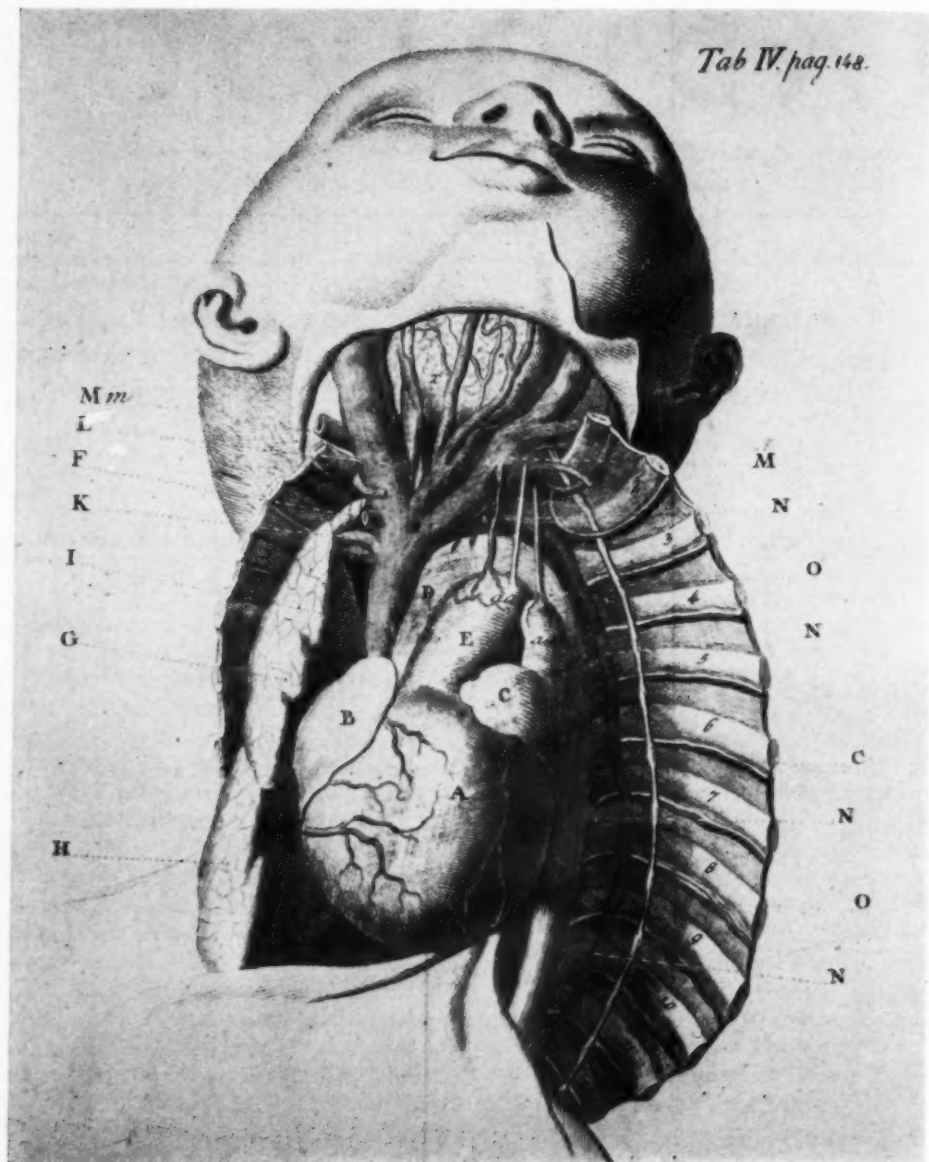


Fig. 1. Photograph of Wrisberg's wood-cut showing first published figure of the lobe of the azygos vein in a 3-year-old boy. Legends are translated from the Latin: A. Pulmonary ventricle. B. Sinus of caval veins with its auricle. C. Sinus of pulmonary veins with its auricle. D. Arteria aorta. E. Pulmonary artery. F. Superior lobe of right lung. G. Middle lobe of same lung [this is really a fused upper and middle lobe]. H. Inferior lobe of same lung. I. Superior or descending vena cava. K. Right vena azyga entering into the cava through a channel formed between two lobes of the right lung. L. Vena subclavia of right side. M. Left subclavian vein. N. Vena azyga of left thorax, inserted into left subclavian. O. Great sympathetic nerve.

—among them a thoracopagus with bilateral lobes of the azygos vein. Perhaps, the lesser incidence in chest plates may be

explained by the difficulty of seeing the "hair-line mesentery" in those cases in which it lies nearest to the spine.

(1) *The Mesoazygos*: The recent finding of an azygos lobe in a dissecting-room cadaver—our first in some 500 specimens—has made it possible to clear up many obscure points regarding the anatomy of this anomalous pleural mesentery. The best of the older accounts—that by Bluntschli (1905), which was based on a dried specimen in the anatomical museum in Zürich—has well nigh passed out of the literature.³

As seen in postero-anterior films, the mesoazygos is a curved descending line having its concavity toward the vertebral column and expanding at its lower end to enclose the "drop-like" azygos vein. This line may pass quite obliquely toward the hilus from the lateral side of the apex, may lie approximately in a vertical plane, splitting the apex, or in a plane medial to the apex. These three positions indicate the amount of lung tissue cut off by the vein and correspond, respectively, to the three types (*a*, *b*, and *c*) described by Stibbe (23) in 1919. Of 23 cases collected by that writer, 48 per cent were of Type *a*; each of the other two types occurred in 26 per cent.

Obviously the specimen presented in this article belongs to Type *a*. As shown in Figure 2, the mesoazygos is a duplication of the costal pleura which sinks into the upper lobe from above, cutting off more than the anatomical apex—that portion which lies above the inferior border of the first rib.

In Plate I (right-hand figure) the lung has been removed to expose the whole of the mesoazygos (here colored yellow), with the azygos vein enclosed in its free inferior border.⁴ The portion of the costal pleura that lines the anterior thoracic wall has also been removed except for a little fringe along the lateral border of the right innominate vein, *i.e.*, the part that is reflected under the phrenic nerve, from the mesoazygos. As shown in the

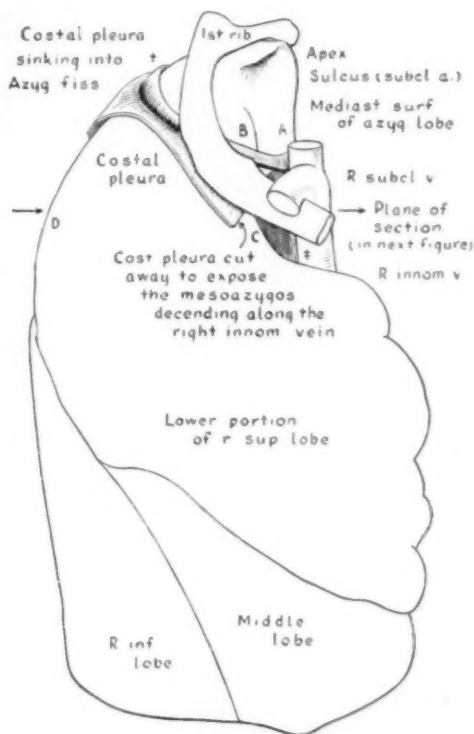


Fig. 2. Anterolateral view of a right lung containing a lobus venae azygos. Subject, a white male of unknown age, who died of cardiac decompensation. Lung emphysematous. The figure illustrates the way the costal pleura sinks into the right upper lobe to form the mesoazygos. Double dagger (‡) indicates anterior line of reflection of costal pleura. Dagger (†) indicates summit of reflection. A, B, C, and D. Margins of lung indicated by same letters in Fig. 3. The right innominate vein has been retracted medially (away from the lung) to expose the mesoazygos.

Plate, the vein leaves the body of the fifth thoracic vertebra just below the point where it receives the right superior intercostal vein (see asterisk). It swings laterally for 1.5 cm., next bends sharply anteriorward for another 6.5 mm.—making an angle of about 25° with the sagittal plane—and then turns medially to join the superior vena cava at the point where the latter receives the innominate veins. This higher termination of the azygos, under the upper part of the manubrium, is characteristic of the anomaly.

Perhaps the most difficult thing to visualize—and the one most neglected in accounts of this anomaly—is the line

³ Priesel's photographs of a dissected specimen (1929) are also very helpful (20).

⁴ In order to show the course of the vein more prominently, the free border has not been colored yellow.

PLATE I

(Sketches by E. A. Boyden; rendered for publication by Lawrence B. Benson)

Left-hand figure. Dissected right lung of an 80-year-old white female, illustrating the distribution of a pre-eparterial bronchus of tracheal origin. In this specimen the apical segmental bronchus (B^1) is absent as such. Its two rami are present but displaced: B^1a (the apical subsegmental ramus) arises from the trachea at its junction with the right stem bronchus; B^1b (the anterior subsegmental ramus) arises as two accessory branches (BX^{1b}) of the anterior segmental bronchus (B^2). The distribution of the displaced B^1a is very similar to that of the injected "supernumerary" bronchus illustrated in Fig. 128 of Brock's article. The middle lobe bronchi were also atypical, exhibiting a superior-inferior pattern like that of specimen 39 in Plates 4 and 6 of the article by Boyden and Hamre.

Right-hand figure. The mesoazygos of a white male subject as seen after removal of the right lung. The azygos lobe (see Fig. 2) occupied the cul-de-sac labeled "pleural recess" and extended to the apex. The mesentery of the vein (colored yellow) is composed of two layers, being a reflection of the costal pleura (cf. Fig. 3). The posterior line of reflection, along the necks of the ribs, is indicated by an asterisk; the anterior line (along the innominate vein) by a double dagger. The outer layer of the mesentery, as it leaves the innominate vein, turns back laterally to line the ribs (see ragged cut edge); the inner layer of the mesentery, as it leaves the innominate vein, turns medially to become continuous with the mediastinal pleura.

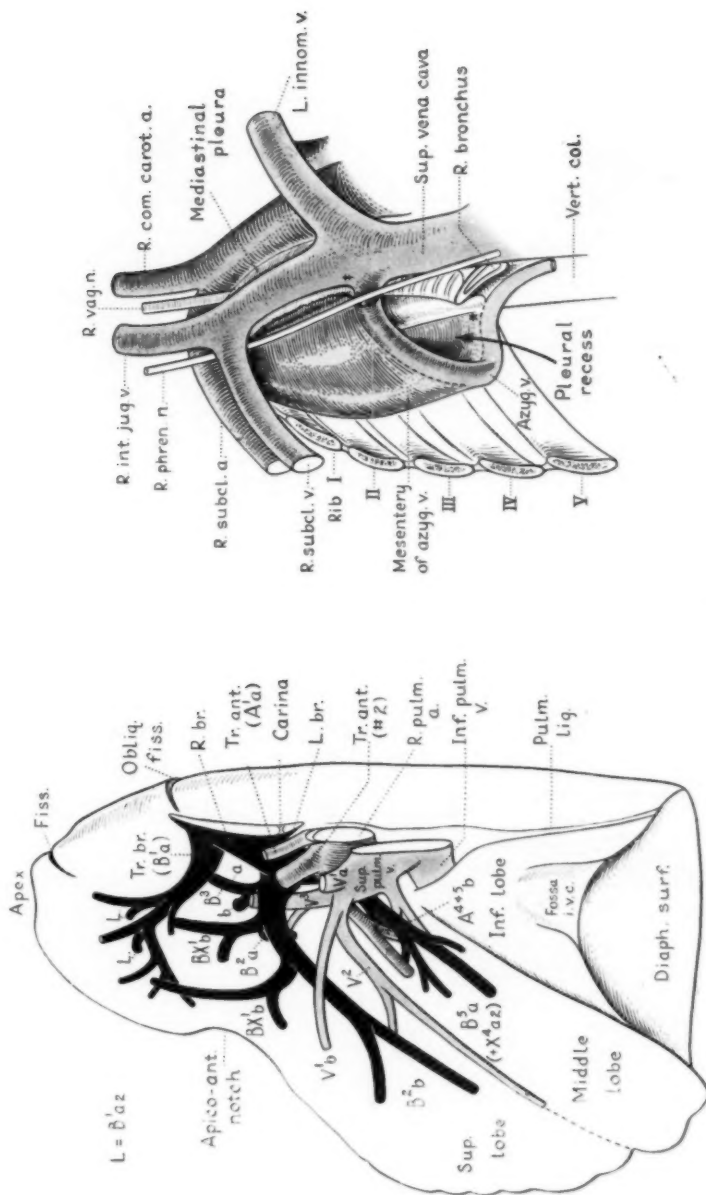


Plate I



PLATE II

Left-hand figure. The dissected mediastinal surface of the lung shown in Fig. 2. Note that the azygos lobe is aerated chiefly by the apical subsegmental rami of the apical bronchus (B^{1a}) and that it is drained by the corresponding subpleural vein (V^{1a}). The anterior ramus of the apical segment (B^{1b}) does not enter the azygos lobe in this specimen. The posterior portion of the azygos fissure (* to †) runs along the necks of the ribs (cf. Fig. 3); the anterior portion (‡ to †) is best shown in the next figure.

Right upper figure. The lobe of the azygos vein retracted to show how the vein and its mesentery cut down into the lung in such a way as to separate the lateral (L) from the apical branches of B^{1a}. One twig of the apical ramus of the posterior segmental bronchus is also separated (Ram. of B^{2a}).

Right lower figure. The right upper lobe of the same specimen drawn from the hilus for comparison with British articles. This shows the three branches bent by the azygos vein.

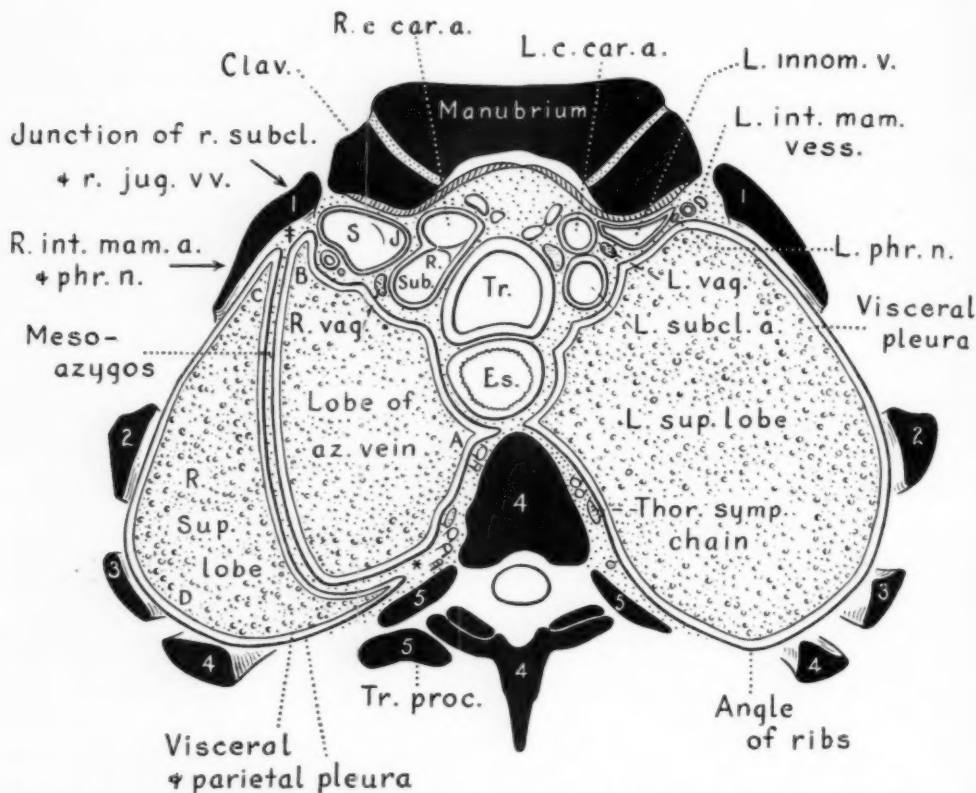


Fig. 3. Transverse section of a normal lung at level of fourth thoracic vertebra. Into this the mesoazygos of Fig. 2 has been inserted, to show the lines of reflection of the costal pleura. The cut is made just superior to the azygos vein. Asterisk (*) indicates posterior line of reflection. Double dagger (‡) indicates anterior line of reflection. Compare with drawing of mesoazygos in Plate I. A to B. Mediastinal surface of azygos lobe. A to asterisk. Paravertebral surface. C and D to asterisk. Costal surface of rest of right upper lobe. (Compare with Fig. 2.)

of reflection of the mesoazygos from the costal pleura. This has the shape of an inverted U or horseshoe. In Plate I, the posterior line of reflection is indicated by an asterisk. This line runs upward, along the necks of the ribs, diverging laterally. The anterior line of reflection, indicated by a double dagger, runs along the deep side of the right innominate vein to the subclavian veins. The closed end of the U, where the two lines unite in an arch, lies in the region of the pleural cupola (dagger, Fig. 2) and will be discussed later.

To clarify this description, a cross section of a freshly sectioned thorax is presented in Figure 3. This is made at the level of the 4th thoracic vertebra.

(In this specimen the arch of the aorta happens to be lower than usual, so that it does not appear in the section.) The specimen is so oriented that the observer is looking upward, toward the apices of the lungs, as in Plate I. Into this drawing the mesoazygos of the first specimen has been inserted. The plane of section cuts the septum transversely just above the arch of the azygos vein. In the section the posterior line of reflection (see asterisk) lies on the 4th intercostal space between the necks of the fourth and fifth ribs; the anterior line (see double dagger) is in relation to the subclavian vein and anterior portion of the first rib. The direction which the mesoazygos takes suggests why this pleural mesentery appears as a line

in a postero-anterior film: one is looking at it edgewise. In the roentgenogram of the chest the vein becomes visible at the level of the acute bend in the mesentery.

The closed end or summit of the inverted U is best seen in Figure 2. The posterior line of reflection arches over the lung under the first intercostal space (see dagger) passes beneath the first rib, then across the pleural cupola to the lateral side of the subclavian vein. From this point it descends as the anterior line of reflection, along the lateral side of the right innominate vein (see double dagger).

The line of reflection may now be fitted into the fissure of the lung. In Plate II (left-hand figure), the fissure starts on the paravertebral surface of the right upper lobe, at a level slightly below the apex of the right lower lobe (see asterisk), then moves upward to the level of the first intercostal space (see dagger), then arches anteriorly along the under side of the first rib to the apical-anterior notch of the upper lobe (see double dagger). When the azygos lobe is pulled down (right upper figure of Plate II) the curved plane of the fissure is seen to reproduce the angulation of the azygos vein.

(2) *Etiology of the Azygos Lobe*: Numerous theories have been advanced to explain the azygos lobe. Yet there are few facts on which all may agree. First, in a 10-mm. human embryo the primitive summit of the right pleural dome lies medial to the arch of the right posterior cardinal vein, *i.e.*, to the vein which will give rise to the upper thoracic portion of the azygos. Secondly, if the lateral position of this vein should be maintained, then the subsequent descent of the heart would drag the arch of the vein and its fold of pleura downward into the apex of the lung. Beyond these elementary statements, all is conjecture. The sequence of events in this rapidly changing region of the embryo is so complicated as to require an intensive study of the lung and pleural cavities in a graded series of human embryos. Prof. L. J. Wells of the Department of Anatomy of the University of Minnesota, who is just

finishing a five-year study of the development of the human diaphragm, which also involves the pleural cavities, has made the suggestion that, since the summit of the primitive pleural dome leads into the pleuropericardial canal in earlier stages, a delay in the closure of this canal would "freeze" the arch of the posterior cardinal in a lateral position. On the left side, the summit of the pleural dome is lower, and the lateral position of the posterior cardinal arch less pronounced. This may explain the rarity of left-sided azygos lobes.

(3) *Bronchial and Vascular Supply of the Azygos Lobe*: As a result of the widespread interest in the segmental structure of the lung, there have been at least three attempts during the last decade to describe the azygos lobe in terms of bronchopulmonary segments—namely by Brock (6) in 1944 Foster-Carter (15) in 1946, and de Minjer, (18) in 1949. These (as well as the earlier Dévé (13), who gave us the name *Lobus venae azygos*) established certain fundamental conceptions, namely, that the lobus is not a supernumerary structure but merely a segregated portion of the right upper lobe, that it is aerated by a variable number of bronchi from one or more segments, and that the descending wedge of the azygos bends certain bronchi, thereby favoring such sequelae as atelectasis, bronchiectasis, and the like.

At the time that these authors analyzed the content of the azygos lobe, however, no detailed account of the branches of the eparterial bronchus and its variations was available; hence a re-interpretation of specimens which they described is necessary.

The terminology used is that employed by Boyden and Scannell (4) in a survey of fifty dissected specimens. The prevailing pattern is that shown at *d* in Plate I of that article, and reproduced here as Figure 4. B¹ is the apical segmental bronchus, with apical (B^{1a}) and anterior (B^{1b}) subsegmental rami (these are the posterior apical and anterior apical bronchi of Brock); B² is the anterior segmental

bronchus, with posterior (B^2a) and anterior (B^2b) subsegmental rami; B^3 is the posterior segmental bronchus, with apical (B^3a) and posterior (B^3b) subsegmental rami. In addition, certain branches of the fourth order have been indicated by arabic numerals. Thus, B^1a2 and B^1b3 distrib-

together with the two lateral branches of B^1a ("L," in the right upper figure) were bent by the azygos. The azygos split the upper lobe along the apical branch (V^3a) of the posterior vein—the venous ramus which normally separates the apical from the posterior segment (see Plate 3,

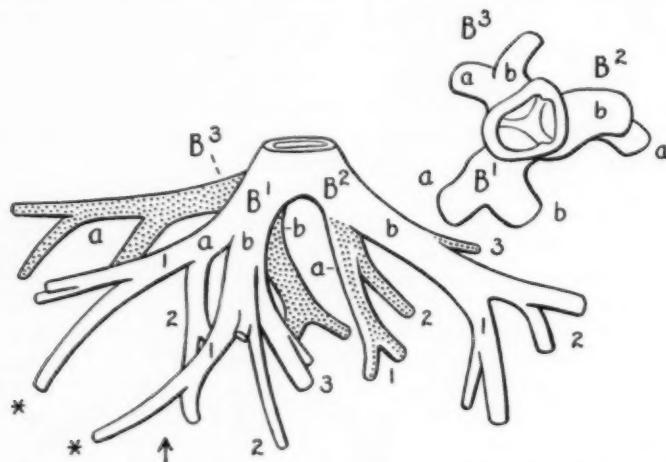


Fig. 4. Typical pattern of bronchi of right upper lobe (after Boyden and Scannell: *Am. J. Anat.*, 1948, d, Plate 1). B^1a , B^1b . Apical and anterior subsegmental rami of apical segment. B^2a , B^2b . Posterior and anterior subsegmental rami of anterior segment. B^3a , B^3b . Apical and posterior subsegmental rami of posterior segment. Arrow indicates apical-anterior notch; asterisk, apical branches. See text for other designations.

ute to the costal surface (*i.e.*, they are lateral branches)⁵; B^1b2 is anterior; B^1a1 , and often B^1b1 , are apical in distribution. The arrow indicates the position of the apical-anterior notch of the upper lobe, an important landmark.

So far as the writer is aware, Plate II is the first complete representation of the bronchi and vascular supply of the right upper lobe in a case of lobus venae azygos. In this specimen it is clear that the azygos lobe is supplied by B^1a1 and by a small mediastinal branch of B^3a .⁶ This latter,

Boyden and Scannell). The lower right-hand figure of Plate II is drawn from the hilar view, for comparison with British accounts of the azygos lobe. Note again the three bent rami and, for future reference, the interfissural crest which separates the territory of B^2a and B^3b .

Altogether, in the literature, 12 cases have been found in which illustrations permit of an approximate identification of bronchi supplying the lobe of the azygos vein. Some, however, are based on incomplete bronchograms, some employ a non-specific terminology, and some involve bronchial variations which are obscure because not enough data concerning the distribution of the bronchi have been made available. I have attempted, however, to identify them in terms of the nomenclature used in Plate II. My apologies are due to authors in those cases in which my interpretation differs from theirs.

⁵ In some specimens these are represented by a single costal branch of the common apical stem. Brock calls this the "axillary apical."

⁶ As shown in the lower right-hand figure of Plate II, B^1a1 appears as two separate stems—a not uncommon variation. Therefore, it might be argued that the left hand B^1a1 could as readily be interpreted as an apical branch of B^1b , in which case our B^1b1 should be called B^1b3 (the lateral branch of B^1b). However, the characteristic relation of B^1b1 to the apical-anterior notch identifies it as B^1b1 .

The conclusions are summarized in the following table:

Larger Azygos Lobes	Supplied By
Brock (6)	
Case 1 (of Atkins) 1944....	B ¹ a and B ¹ b
Case 2 (1944).....	B ¹ b
Foster-Carter (15)	
Case 1 (1946).....	B ¹ a and B ² a
Case 2 (1946).....	B ¹ a
de Minjer (18)	
Case 1 (1949).....	B ¹ a and B ¹ b
Case 3 (1949).....	B ¹ a and B ¹ b
Boyden (1952).....	B ¹ a and B ² a
Smaller Azygos Lobes	
Dévé (13)—Case 2 (1899)....	B ¹ a and B ¹ b
Cairney (7)—(1923).....	B ¹ a
de Minjer (18)	
Case 2 (1949).....	B ¹ b
Case 4 (1949).....	B ¹ b
Bendick and Wessler (1)— (1928).....	Small branch of B ¹

A survey of the specimens listed above indicates that the azygos lobe is aerated primarily by mediastinal branches of the apical segmental bronchus (B¹) and occasionally by branches of the apical portion of the posterior segmental bronchus (B³), that the smaller lobes tend to be supplied by one branch, and that in the majority of cases the azygos vein descends erratically into the substance of the lung in such a way as to bend and separate the branches of a given segment.

II. PRE-EPARTERIAL BRONCHI⁷

Bronchi arising from the right side of the trachea or the lateral wall of the right stem bronchus are commonly described as "supernumerary." Although Brock (6), Foster-Carter (15), and Huizinga and Smelt (17) have all rightly distinguished between "aberrant apical" or "displaced apical" bronchi and "true supernumerary" bronchi, nevertheless even these careful

investigators have described, as supernumerary bronchi, separate trunks that are merely displaced apical subsegmental rami. (I refer to Brock's Case 1, Fig. 128; to Foster-Carter's Case 2, Fig. 15; and to Huizinga and Smelt's Case 1, Fig. 18.)

What is the reason for this? I believe it is twofold: First, clinical workers are obliged to make judgments largely from bronchograms and so rely more on the mode of branching than on the distribution of bronchi; yet both criteria are essential to identification. Second, until recently, many have felt that it is not necessary, from a practical standpoint, to know the subsegmental bronchi. Yet the latter are the chief actors in the drama of variation.⁸ We have seen how difficult it was to make an accurate judgment of the composition of the azygos lobe until all subsegments were accounted for. Similarly, a bronchus should not be called "supernumerary" until it is established that it is not distributing to a recognized portion of the lung.

The point in question is best illustrated by the left-hand figure of Plate I. The bronchus labeled B¹a is a tracheal bronchus which distributes to the zone normally aerated by the apical ramus (or B¹a branch) of the apical bronchus. No other ramus of the upper lobe bronchus supplies that zone. Therefore it is a *displaced* B¹a (the posterior apical of Brock) and not a supernumerary bronchus (cf. Brock's Fig. 128).

In this same specimen (Plate I), the anterior ramus (B¹b) arises as two displaced branches (BX¹b) from the anterior segment (B²). To make analysis still more difficult, the middle lobe bronchi have a superior-inferior pattern with a formula $(B^3a + BX^4a2)/(B^4 + B^5b)$.

This distinction between displaced and supernumerary bronchi was made as early as 1889 by Chiari, Professor of Pathology in Prague (8). He described three kinds of structures to be found above the "epar-

⁷I have introduced this term to designate any anomalous bronchus which arises above the main eparterial bronchus. It may be either a "supernumerary" or a "displaced" bronchus. A post-eparterial bronchus would be one which arises below the level of the eparterial bronchus, such as an anterior segment (B³) from the middle lobe stem (cf. Boyden and Hamre (3) Fig. 2; and Brock's Fig. 127).

⁸Claus Esser (14), in an outstanding monograph in the *Fortschritte* (1951), is apparently the first radiologist to catalogue the appearance of all the subsegments in bronchograms.

terial side bronchus" or its site: (1) The eparterial bronchus itself may have a tracheal origin. (2) A truly accessory bronchus may develop above the normal eparterial side bronchus. He reported 5 tracheal diverticula (9) in 6,000 autopsies.⁹ (3) A detached ascending (*i.e.*, apical) bronchus, or twig of the ascending, may arise above the eparterial on the right stem bronchus, or on the trachea, and pass into the apex of the right lobe (8, 10). Because of this, Chiari cautioned, a judgment should not be made until all branches of the eparterial bronchus have been accounted for.

In view of this analysis and the evidence presented in Plate I, it would seem that it is no longer correct to say that, if the eparterial bronchus is trifurcate, an apical bronchus arising above it must be supernumerary. In fact, I have not been able to find a single case of a pre-eparterial bronchus passing to an undivided right upper lobe which has been proved to be "supernumerary."

SUMMARY

Two anomalies of the right upper lobe are presented, illustrating both the vascular supply and the distribution of subsegmental bronchi to the affected areas.

The first—a case of *Lobus venae azygos*—clarifies hitherto obscure details regarding the line of reflection of the mesoazygos from the parietal walls. In addition, 12 cases from the literature have been analyzed from the standpoint of determining which subsegmental bronchi are involved in this anomaly.

The second case—a pre-eparterial bronchus of tracheal origin—is interpreted as a displaced ramus of the apical segmental bronchus. In reviewing the literature, it is concluded that most cases of so-called supernumerary bronchi are merely dis-

placed rami of the apical bronchus and should not be considered as accessory.

Institute of Anatomy
University of Minnesota
Minneapolis 14, Minn.

REFERENCES

1. BENDICK, A. J., AND WESSLER, H.: The Azygos Lobe of the Lung. *Am. J. Roentgenol.* 20: 1-6, July 1928.
2. BLUNTSCHLI, H.: Bemerkungen über einen abnormen Verlauf der Vena azygos in einer den Oberlappen der rechten Lunge durchsetzenden Pleurafalte. *Morphol. Jahrb.* 33: 562-576, 1905.
3. BOYDEN, E. A., AND HAMRE, C. J.: An Analysis of Variations in the Bronchovascular Patterns of the Middle Lobe in Fifty Dissected and Twenty Injected Lungs. *J. Thoracic Surg.* 21: 172-188, February 1951.
4. BOYDEN, E. A., AND SCANNELL, J. G.: An Analysis of Variations in the Bronchovascular Pattern of the Right Upper Lobe of Fifty Lungs. *Am. J. Anat.* 82: 27-74, January 1948.
5. BREMER, J. L.: Accessory Bronchi in Embryos; Their Occurrence and Probable Fate. *Anat. Rec.* 54: 361-374, Nov. 25, 1932.
6. BROCK, R. C.: Observations on the Anatomy of the Bronchial Tree, with Special Reference to the Surgery of Lung Abscess. Part V. The Whole Lung: Anomalies and Compound Abscesses. *Guy's Hosp. Rep.* 93: 90-107, 1944.
7. CAIRNEY, J.: The Lobe of the Azygos Vein; Note on Two Additional Cases. *J. Anat.* 58: 54-58, 1923.
8. CHIARI, H.: Über das Vorkommen eines doppelten eparteriellen Seitenbronchus an dem rechten Stammbronchus des Menschen. *Prag. med. Wchnschr.* 14: 560, 1889. Also *Ztschr. f. Heilk.* 10: 470-478, 1889. (Second journal, reporting case in full, not available to author.)
9. CHIARI, H.: Über einen neuen Typus von Missbildung an der Trachea des Menschen. *Beitr. z. path. Anat. u. z. allg. Path.* 5: 329-344, 1889.
10. CHIARI, H.: Über eine neue Form von "Dreitheilung der Trachea" bei einem 16 Tage alten Knaben mit sonstigen Bildungs-Anomalien, darunter auch Mangel der Milz und Verlagerung des Ligamentum hepato-duodenale. *Prag. med. Wchnschr.* 16: 89-92, 1891.
11. CLIVE F. T.: Mass Radiography in Women: Review of 30,000 Examinations in W. A. A. F. Recruits. *Tubercle* 24: 63-67, April 1943.
12. COLLINS, E. W.: On Accessory Lobes of the Human Lungs. *Trans. Roy. Irish Acad.* 25 (Science): 329-336, 1875.
13. DÉVÉ, M.: Le lobule de la veine azygos ou "lobule de Wrisberg." *Bull. mém. Soc. anat.* 74: 489-514, 1889.
14. ESSER, C.: Topographische Ausdeutung der Bronchien im Röntgenbild mit Berücksichtigung der neuzeitlichen Nomenklatur. *Fortschr. a. d. Geb. d. Röntgenstrahlen, Ergänzungsband* 66, Stuttgart, Georg Thieme Verlag, 1951.
15. FOSTER-CARTER, A. F.: Broncho-pulmonary Abnormalities. *Brit. J. Tuberc.* 40: 111-124, October 1946.
16. HERXHEIMER, G.: Über einen Fall von echter Nebenlunge. *Centralbl. f. allg. Path. u. path. Anat.* 12: 529-532, 1901.
17. HUIZINGA, E., AND SMELT, G. J.: Bronchography. Assen, Netherlands, Van Gorcum & Co. Ltd., 1949.
18. DE MINJER, A.: The Lobe of the Azygos Vein with Special Reference to Its Bronchial Tree. *Arch. chir. Neerlandicum* 1: 232-252, 1949.

* Then, in 1901, Herxheimer (16) found a small functional "third lung" stemming from a tracheal bronchus 2.5 cm. down from the cricoid. This "sat above the lung on the right side" and had caused stenosis of the trachea where it pressed against its right side. A similar case, in the neck, on the right side of the trachea was described by Müller (19) in 1918. Both of these are true accessory lungs, arising from supernumerary bronchi.

19. MÜLLER, H.: Über Lappungsanomalien der Lungen, insbesondere über einen Fall von trachealer Nebenlunge. *Virchow's Arch. f. path. Anat.* **225**: 284-299, 1918.
20. PRIESEL, R.: Der Lobus venae azygos im Röntgenbilde. *Fortschr. a. d. Geb. d. Röntgenstrahlen* **40**: 804-809, November 1929.
21. v. ROKITANSKY, C.: *A Manual of Pathological Anatomy*. Sydenham Soc., London, 1852, Vol. 4, p. 38.
22. SCHMITZ-CLIEVER, E.: Über das Vorkommen des Lobus venae azygos der linken Lungenseite. *Fortschr. a. d. Geb. d. Röntgenstrahlen* **72**: 728-731, April 1950.
23. STIBBE, E. P.: The Accessory Pulmonary Lobe of the Vena Azygos. *J. Anat.* **53**: 305-314, 1919.
24. VELDE, G.: Ein eigentümlicher Schattenstreifen in der rechten Lungenspitze. *Fortschr. a. d. Geb. d. Röntgenstrahlen* **36**: 315-318, August 1927.
25. WRISBERG, H. A.: *Observationes anatomicae de vena azyga duplici, aliisque hujus venae varietatibus*. *Novis Commentariis Societatis Reg. Scient., Göttingen Anno 1777, Tome VIII, 14. Also, Commentationum medici, physiologici, anatomici et obstetrici argumenti.* **1**: 127-148, 1800.

SUMARIO

La Distribución de los Bronquios en las Anomalías Macroscópicas del Lóbulo Superior Derecho, y en Particular los Lóbulos Subdivididos por la Vena Acigos o que Contienen Bronquios Prearteriales

Preséntanse 2 casos de anomalías del lóbulo superior del pulmón derecho, que ilustran tanto el riego vascular cuanto la distribución de los bronquios subsegmentales a la zona afectada.

La primera anomalía, un lóbulo acigos (*lobus venae azygos*), esclarece puntos hasta ahora oscuros con respecto a la línea de desviación de la mesoacigos desde las paredes torácicas. En el caso descrito, la mesoacigos aparece como duplicación de la pleura costal, hundiéndose desde arriba en el lóbulo superior e interceptando el tejido pulmonar que queda más arriba del borde inferior de la primera costilla.

Analízanse 12 casos tomados de la literatura, que indican que el lóbulo acigos es aireado primariamente por las ramas

mediastínicas del bronquio segmental apical y a veces por ramas de la porción apical del bronquio segmental posterior, que los lóbulos más pequeños suelen ser atendidos por una rama, y que, en la mayoría de los casos, la vena acigos desciende caprichosamente a la substancia del pulmón, de tal modo que dobla y separa las ramas de un segmento dado.

La segunda anomalía descrita, bronquio prearterial de origen en la tráquea, se considera como rama desplazada del bronquio segmental apical. Un repaso de la literatura indica que la mayor parte de los casos de supuestos bronquios supernumerarios representan en realidad ramas desplazadas de este género y no verdaderos órganos accesorios.

Tuberculosis of the Stomach¹

WALTER GAINES, M.D., HOWARD L. STEINBACH, M.D., and ELIZABETH LOWENHAUPT, M.D.
San Francisco, Calif.

TUBERCULOSIS of the stomach is a relatively rare condition. Its incidence varies with the material being evaluated, that is, routine autopsies, autopsies performed on patients with pulmonary tuberculosis, or specimens examined following gastric resection. Table I summarizes the occurrence of gastric tuberculosis and

Clinically, gastric tuberculosis is important because, in the absence of active pulmonary or systemic tuberculosis, it may be curable by gastric resection. To date no case has been reported as cured by one of the newer chemotherapeutic agents available for the treatment of tuberculous infections, probably because

TABLE I: INCIDENCE OF GASTRIC TUBERCULOSIS

	Source	No. of Specimens	No. of Cases
In routine autopsies			
Good	Collected from reports, chiefly German, prior to 1931 (20)	71,871	153 (0.21%)
Sullivan <i>et al.</i>	Cook County Hospital, Chicago, 1929-38 (45)	11,481	2 (0.02%)
Collinson and Stewart	Great Britain, prior to 1927 (11)	10,000	3 (0.03%)
Cameron	University of Michigan Hospital, prior to 1929 (8)	2,900	1 (0.03%)
In autopsies of patients with pulmonary tuberculosis			
Good	As above	15,165	80 (0.52%)
Crawford and Sawyer	Fitzsimons Hospital, Denver, 1921-33 (13)	1,400	0
Browne <i>et al.</i>	Charity Hospital, New Orleans, 1922-42 (7)	1,321	30 (2.3%)
Sullivan <i>et al.</i>	As above	554	2 (0.36%)
In gastric resections			
Sullivan <i>et al.</i>	As above	75,000	1
Good	As above	7,416	3 (0.04%)
Knoflach and Pape	Vienna, 1904-34 (26)	4,000	5 (0.12%)
Demel	Germany, prior to 1923 (14)	1,568	3 (0.19%)

reveals this variability. In addition, it is obvious that the frequency of the lesions varies, as might be anticipated, with the geographical location and the period during which the statistics were collected. Possibly this accounts for the higher figures quoted by Good (20), since most of his material is a compilation of European experience prior to 1931.

In the cases reported prior to 1931, gastric tuberculosis tended to be associated with pulmonary tuberculosis (Renander, 36; Broders, 6; Demel, 14). Recently, however, more cases are being reported without changes evident in the chest roentgenogram (Walters, 46; Morris, 28; Connolly, 12; Ostrum, 31; Case I in the present paper).

of the difficulty in making a clinical diagnosis. Since the radiologist may be able to suggest the possibility of this diagnosis, it appears worth while to report three new cases of tuberculosis of the stomach and one case of benign gastric ulcer which had become secondarily infected by tubercle bacilli, as well as to summarize the findings in the reported cases from the radiological point of view. All the pathological tissue sections to which reference is made in the following case reports have been reviewed by one of the authors (E. L.).

CASE REPORTS

CASE I: J. F., a 26-year-old married Negro male, was first seen April 8, 1948, at the University of

¹ From the Divisions of Radiology and Pathology, University of California School of Medicine, San Francisco, Calif. Accepted for publication in October 1951.

California Out-Patient Department, complaining of epigastric pain occurring after meals for the preceding year. At first the pain had been relieved by baking soda, but later this lost its effectiveness. The pain had since become progressively worse and was localized to a small area in the epigastrium. It was not relieved by eating. There was no nausea, vomiting, hematemesis or melena. There had been some weight loss.

The patient had been discharged from the Navy because of "nervousness." A brother had died of "tuberculosis" two years previously, but the patient stated that he had never had intimate contact with his brother.

Physical examination was entirely negative, as was a serologic test. The blood and urine examinations were not remarkable, and three stool specimens were negative for occult blood. A roentgen examination of the upper gastro-intestinal tract was performed April 29, 1948. Dr. H. Rees reported his findings as follows: "There was a constant, sharply demarcated, rounded crater projecting from the lesser curvature of the stomach at the mid portion of the body. The remainder of the gastric outline was not remarkable; the mucosal pattern was well defined, peristalsis was active and complete to the pylorus. The duodenal bulb filled promptly but appeared markedly contracted and irritable, with rapid emptying. The mucosal pattern was distorted in the region of the bulb, but no definite constant fleck or crater could be demonstrated. *Impression:* Gastric ulcer, lesser curvature; marked deformity and irritability of the duodenal bulb with possible duodenitis; although no crater was demonstrated, a duodenal ulcer may be present."

The patient was treated with a Sippy diet, aluminum hydroxide gel, and antispasmodics for one month, with early relief but later return of the original pain. He was re-examined roentgenologically on June 2, 1948 (Fig. 1), and the following conclusion was reached by Dr. J. R. Bryan: "Gastric ulcer and duodenal ulcer. The gastric ulcer has not changed significantly in appearance since the examination of April 29, 1948. The duodenal ulcer is more definitely apparent on this examination." Gastric analysis on June 4 revealed no free acid, with a rise to 38 units of free acid after histamine. Gastroscopy was done on June 15, and "the antrum was reported to be entirely normal. The area of the lesser curvature was not seen because of the patient's lack of cooperation. The greater curvature was normal, but some pooled blood was seen in this region."

Because of the poor response to the medical regime and the presence of both gastric and duodenal ulcers, the patient was admitted to the University of California Hospital on July 1, 1948, for surgery. On July 3, a partial gastrectomy was performed. On the lesser curvature of the stomach and 5 cm. distal to the esophagus was an acute inflammatory mass measuring 4 cm. in diameter with edema of the adjacent stomach and gastrohepatic ligament. A



Fig. 1. Case 1. Gastric ulcer along upper portion of the lesser curvature. Duodenal ulcer.

second ulcer was present in the duodenum just distal to the pylorus associated with a friable, inflammatory mass. Resection was completed in the usual manner, with a gastro-enterostomy.

The pathological report on the gross surgical specimen was, in part, as follows: "An ulcer, 2 cm. in diameter, is present near the upper margin on the lesser curvature. Here the wall is slightly thickened, firm, and the mucosal borders overhang the ulcer crater. The mucosa of the remainder of the specimen shows no gross changes. Several lymph nodes, up to 1 cm. in diameter, are present in the tissue along the lesser curvature. One of these on section shows a soft gray to yellowish necrotic center."

Histologically sections of the stomach showed distinctly thickened and occasionally polypous mucosa, heavily infiltrated with lymphocytes, which formed follicles at several sites (Fig. 2). The ulcer crater was deep, filled with necrotic tissue, and lined by epithelioid cells and giant cells of Langhans type. Similar cells surrounded focal areas of necrosis deep in the stomach wall. A lymph node showed a similar reaction about a central area of necrosis. Careful search of multiple sections eventually disclosed a few acid-fast organisms. The diagnosis was tuberculosis of the stomach.

Convalescence was uneventful. A tuberculin skin test (0.00002 mg. Purified Protein Derivative) was

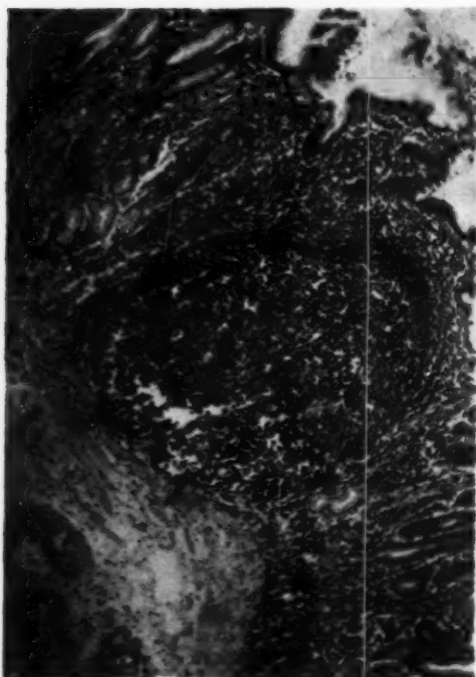


Fig. 2. Case I. A lymph follicle is present in the gastric mucosa shown in the central area of the photograph. Numerous lymphocytes are present throughout the remainder of the mucosa. (This type of chronic gastritis was observed in an area of stomach remote from the ulcer; it is present also in Case II.) Hematoxylin and eosin. $\times 80$.

positive with a 1 to 2 cm. area of edema and induration. A roentgenologic examination of the chest, July 12, 1948, revealed no evidence of pulmonary or cardiac disease.

The patient was transferred to the Veterans Administration Hospital (Fort Miley, San Francisco) on July 15, 1948. Further studies were performed there, including excretory urography, barium enema, plain film of the abdomen, and further chest films. All the examinations were reported as negative. A roentgen examination on July 31, 1948, revealed a "normal functioning gastro-enterostomy." Multiple examinations of fecal specimens failed to reveal acid-fast organisms.

While the above procedures were being carried out, the patient was receiving supportive therapy only. On Aug. 5, 1948, he was placed on streptomycin, 0.5 gm. b.i.d. for forty-five days. During this time there was marked improvement in his general condition and he gained a total of 15 pounds. He was discharged to the Out-patient Service on Oct. 30, 1948, having received maximal hospital benefit.

From Jan. 26 to Feb. 24, 1949, the patient was hospitalized at Fort Miley, for re-evaluation, and no

active disease process was found. He was seen again as an outpatient as late as Dec. 12, 1949, at which time physical examination and roentgen examination of the chest and gastro-intestinal tract showed no evidence of active disease. The patient was subjectively well and working.

CASE II: L. C., a 42-year-old Negro male, was admitted to the San Francisco Hospital (Stanford Service) for the first time on Jan. 20, 1943. He had been well until one year previous to entry, when he



Fig. 3. Case II. Papillary or nodular masses in the prepyloric region. The pylorus is narrowed and irregular.

began to experience occasional attacks of epigastric pain after eating, relieved somewhat by baking soda. About six months prior to entry severe post-prandial vomiting developed, and for three months the patient had been living on a liquid diet. He had lost 20 pounds in the preceding six months. The only symptom was a "dry cough" for one month.

Physical examination was not remarkable. The patient showed some emaciation but no abdominal masses were palpable. The urine and blood findings were not abnormal. The serum Kahn and Kolmer tests were negative. On Jan. 25, 1943, a gastroscopic examination showed pyloric obstruction without ulceration. A roentgen examination of the stomach on the same day was reported as follows: "In the prepyloric region there are irregular papillary or nodular masses. The pylorus is narrowed and

irregular. There is a question of a small ulcer crater. The duodenal cap is smooth and fills well" (Fig. 3). Gastric analysis on Jan. 28 revealed no free acid; the total acidity was 40 units.

On Feb. 9, a partial gastric resection with an anterior Polya gastro-enterostomy was performed by Dr. J. W. Cline and Dr. J. M. Buehler. Surgical exploration revealed an annular prepyloric tumor producing almost complete obstruction of the pyloric canal. The lesion was described by Dr. R. H. Quillinan as irregular and measuring 4 cm. in its



Fig. 4. Case II. A tubercle formed of epithelioid cells and Langhans type giant cells is shown in the gastric mucosa at the lower right. This tubercle is surrounded by lymphocytes. It was present at the border of the ulcer and by progressing to necrosis produced loss of surface tissue. This is the method of extension of the gastric ulcers, which become large. Hematoxylin and eosin.

greatest diameter. The border was firm and raised about 0.4 cm. above the flat ulcer base. On the serosal aspect in this area were two large, firm lymph nodes.

In sections of the stomach, reviewed by one of the authors (E. L.), the mucosa was infiltrated with lymphocytes and plasma cells. A distinct tubercle at a site well separated from the ulcer base displaced gastric glands which still covered the surface (Fig. 4). The ulcer itself showed a base of vascular granulation tissue, but very little other connective-tissue proliferation. Dense collections of lymphocytes

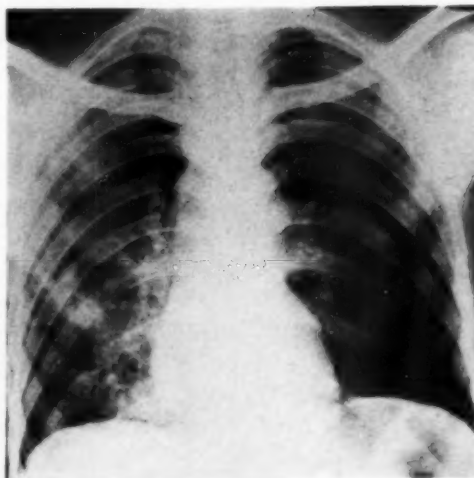


Fig. 5. Case II. Chest film, Feb. 19, 1943, demonstrating advanced pulmonary inflammatory disease of the right lung.

extended between muscle bundles to form aggregates on the serosal surface. In several of these collections were distinctive tubercles formed of epithelioid cells with Langhans type giant cells. The lymph nodes showed only lymphoid hyperplasia without necrosis or proliferative granulomatous reaction.

Following the gastric resection, persistent fever and expectoration developed. A tuberculin skin test (1:100) was positive. A chest film revealed severe inflammatory disease of the right lung (Fig. 5). Bronchoscopy was not informative. On April 11, 1943, acid-fast bacilli were demonstrated in the sputum. The patient lost weight and strength rapidly and died on April 20. No autopsy was obtained. The final diagnosis was extensive bilateral pulmonary tuberculosis and tuberculosis of the stomach.

CASE III: J. O., a 31-year-old male of Mexican descent, was admitted to the University of California Hospital on March 19, 1927, following a diagnostic investigation in the Medical Clinic. He complained of pain in the left lower quadrant and in both legs for the preceding five months. Three months prior to admission he first noticed a mass in the left lower abdomen. Further questioning revealed that some five months prior to the discovery of the mass he had suffered from "sour eructation" and belching after meals. Epigastric pain developed, which was not always related to meals but frequently occurred within an hour or two after eating. Three months prior to admission, nausea and vomiting occurred and had become progressively worse. There was no jaundice, nor were there clay-colored, tarry, or bloody stools. The patient had lost 35 pounds in the past year.

In 1920, an "abscessed gland" on the right side of the neck had been incised and drained. Six months prior to admission a fistula-in-ano had been removed.

Physical examination revealed multiple discrete, free, firm movable nodes in the cervical and inguinal regions, and a few in the axillary regions. In the thorax vocal fremitus was diminished on the left side posteriorly, and paravertebral dullness was described posteriorly on the left. The only abnormal finding in the abdomen was a firm, immovable, non-tender mass in the left lower quadrant.

quite satisfactorily. At six hours there is a 40 per cent gastric residue. *Conclusion:* Lesion at the pylorus, probably an ulcer."

A laparotomy, on March 21, revealed a semi-fluctuant, retroperitoneal mass on the left side of the spine extending from the first lumbar vertebra down to the pelvic brim. No definite lesion of the spine was palpable. In addition there was a mass surrounding the duodenum, distal to the pylorus, involving about 90 per cent of its circumference. There were palpable enlarged regional lymph nodes. The mass obstructing the pylorus had the appearance of

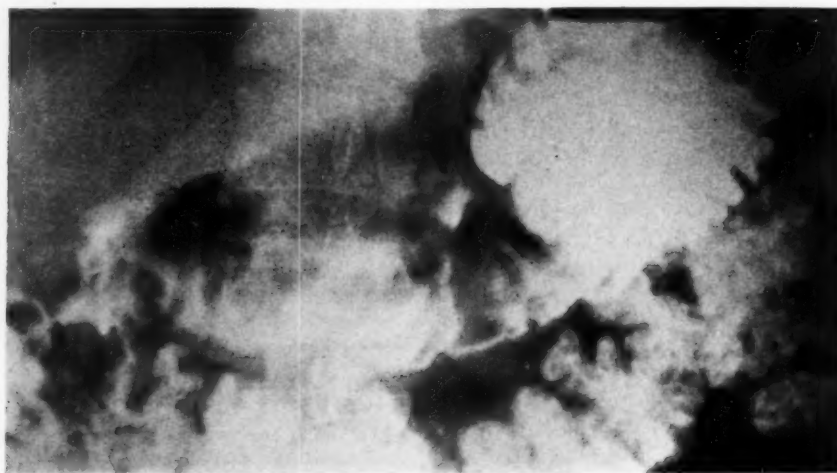


Fig. 6. Case IV. A deep ulcer high on the posterior surface of the lesser curvature of the pars media.

Examination of the blood revealed a hemoglobin content of 65 per cent (Sahli) and an erythrocyte count of 3,460,000 per cu. mm. The remainder of the blood count and the urinalysis was not abnormal. The Kahn test was negative. An Ewald meal showed 35 units of free acid with a total acidity of 58 units. Some stool specimens were positive for occult blood; others were negative.

A roentgen examination of the stomach, Feb. 15, 1927, was reported by Dr. C. Bowen as follows: "Stomach smooth in outline except at the antrum, where there is some irregularity; peristalsis deep and rate increased. Cap not indicated. At six hours there is a large gastric residue with only a small amount of barium passing the pylorus. *Conclusion:* Obstructive lesion at the pylorus." A chest examination, March 2, was reported as normal. Another gastro-intestinal examination was done on March 7, and the following report was made: "Peristaltic waves definitely increased. There is a constriction for about 3 cm. at the pyloric end of the stomach. Barium is forced through with difficulty. There is a small irregular projection from this constricted area, which is constant. The cap fills out

an inflammatory lesion. A Mayo-Polya type gastric resection and enterostomy were performed.

The serosal surface of the stomach in the vicinity of the pylorus was studded with tiny white nodules. The wall in the pyloric area and that of the duodenum was greatly thickened. A cavity surrounded the pylorus and extended between the muscle layers of the stomach for a distance of 2.5 cm. It opened into the lumen of the duodenum, and the much narrowed pyloric orifice opened into this. The pyloric orifice could barely admit a matchstick, and the mucosa in this vicinity was ulcerated.

The portions of gastric mucosa available for study showed no changes. Sections from the pyloric area revealed massive necrosis with very little connective-tissue reaction. Granulomatous tissue, formed of epithelioid cells and Langhans-type giant cells surrounding necrotic fields, extended through all layers of the bowel.

The postoperative course was uneventful. On April 1, 1927, a paravertebral puncture was performed and 30 c.c. of straw-colored fluid were obtained. No bacteria were found on direct smears. The culture revealed no growth, but two guinea-pigs

were inoculated and tuberculosis developed. On April 7, 1927, a body cast was applied. The patient was discharged with the diagnosis of tuberculous lymphadenitis, tuberculosis of the stomach, and tuberculous paravertebral abscess.

CASE IV: E. C., a 31-year-old Chinese-American, was first seen at the University of California Hospital by Dr. Leon Goldman on Oct. 9, 1950, following transfer from another hospital. The patient gave a four-year history of gnawing, burning epigastric pain which was relieved by milk. Ten days prior to his first hospital admission he experienced an acute episode of severe abdominal pain accompanied by hematemesis. He was admitted to another hospital where he had received numerous whole blood transfusions. Melena and a progressive anemia developed.

Physical examination revealed a semistuporous patient who could be aroused easily but fell asleep promptly when not disturbed. The cardiac rate was 130 per minute; the blood pressure was 68 mm. of mercury systolic and 40 mm. diastolic. The abdomen was soft, with no palpable masses and no tenderness.

The laboratory findings during the previous hospitalization were reported as follows: On Sept. 28, 1950, the hemoglobin was 98 per cent (Sahli); the erythrocyte count was 5,000,000 per cu. mm.; the total white cell count was 15,000 per cu. mm. The urine had a specific gravity of 1.016, a pH of 4.5, and albumin 2+. The urinary sediment contained a moderate number of hyaline and finely granular casts together with 5 to 7 leukocytes per high-power field. On Oct. 9 the hemoglobin was 40 per cent (Sahli) and the erythrocyte count 3,010,000.

Roentgen examination of the chest on Oct. 9 revealed mottled infiltration in the left lower lobe at the base. The gastro-intestinal findings (Fig. 6) were reported as follows by the examiner. "The esophagus appeared normal. Examination of the stomach revealed approximately 30 per cent six-hour retention and a deep ulcer crater high in the corpus on the lesser curvature posteriorly. The duodenum and upper small bowel appeared normal. Barium apparently taken previously was distributed throughout a normal appearing colon. *Conclusion:* Gastric ulcer."

On Oct. 9, 1950, the patient was operated on by Dr. Leon Goldman, who made the following report: "High in the stomach along the lesser curvature was a large ulcer with infiltration into the gastrohepatic omentum in the region of the left gastric artery. There were some adhesions about the pyloric end of the stomach." No other changes were noted. A subtotal gastric resection with an anterior gastrojejunostomy was performed.

Along the lesser curvature the serosa appeared dull, opaque, and adherent to lesser omental fat. On opening the specimen, an ulcer 2.5 cm. in diameter was seen midway between the two surgical margins

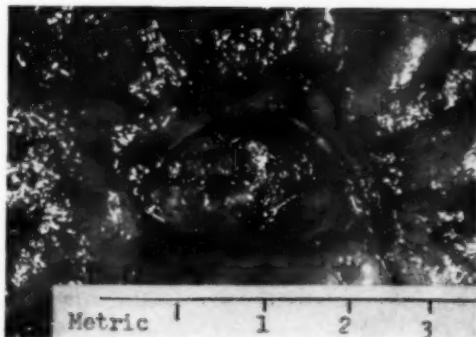


Fig. 7. Case IV. Gross appearance of the ulcer. This is a quite usual chronic gastric ulcer, the sharp proximal margin being to the right and the sloping distal margin to the left. The base is formed of dense scar.

on the lesser curvature. It had precipitous edges and a necrotic base on which a thrombosed vessel projected. Two small lymph nodes were found along each curvature (Fig. 7).

Microscopic examination confirmed the gross impression of a chronic gastric ulcer, its chronicity being indicated by dense scar tissue extending through all muscle coats to the serosal surface and by the advanced organization of the vascular thrombus. There was no unusual inflammatory reaction in the stomach itself. However, one of the lymph nodes was replaced by a proliferative granulomatous inflammatory process, which was shown histologically to be tuberculosis.

PATHOGENESIS AND PATHOLOGY

A detailed discussion of the pathogenesis and pathology of gastric tuberculosis is not within the scope of this report. It has been discussed adequately by Broders (6), Biernath (3), Browne *et al.* (7), and Palmer (32). Ackermann (1) summarizes the possible modes of involvement as (a) direct infection, (b) hematogenous dissemination, (c) lymphatic dissemination, or (d) invasion from the serosa. Biernath classified the gross pathological manifestations as (a) multiple small mucosal erosions, (b) ulcerations, (c) a hypertrophic, infiltrating tumorous mass, (d) a disseminated miliary spread, and (e) pyloric obstruction from an extragastric mass such as involved nodes or granuloma. Of our cases, Case III is of the last type, the others being classed as ulcerative.

The three tuberculous ulcers studied

in this series, however, present distinct differences from the usual type of gastric ulcer. The lesions are chronic, as judged by the clinical histories of from four months or more to at least a year, and by the large gross extent of the lesions. Yet fibrous reaction is noticeably lacking in all. They are characterized by massive tissue destruction producing large and deep craters. The reaction appears to extend by contiguity to involve lateral margins of the ulcer and serosal surfaces (Fig. 4). With these large lesions, the reaction remains destructive. This represents the allergic and progressive type of tissue response in tuberculosis (21). Just as is to be expected in this advanced stage, the process involves the regional lymph nodes.

In spite of the fact that bacilli frequently are found in the gastric contents in pulmonary tuberculosis, gastric lesions are quite rare in this disease. It seems likely that local conditions must regulate the penetration of the organisms into the stomach wall. It is known that lymphatic tissue (21) is a site of predilection for the localization of the tubercle bacillus. Chronic gastritis, associated with achlorhydria, is an accompaniment of debilitating disease and is characterized by the presence of lymphoid tissue between atrophic mucosal glands (5). In 2 of the 3 cases reported free hydrochloric acid was not present prior to gastric resection. These 2 cases (I and II), as nearly as could be determined, showed thickening and lymphocytic infiltration of gastric mucosa in sites removed from the ulcer (Fig. 2).

With these facts in mind, two possibilities present themselves. On the one hand, these patients may have had a pre-existing hypertrophic type of chronic gastritis with coincidental viable tubercle bacilli in the gastric contents. These might lodge in lymphoid follicles and hence initiate gastric ulceration. Evidence might perhaps be in favor of this hypothesis in Case I, since no active tuberculosis was demonstrated outside of the stomach. On the other hand, the gastritis might occur not as a primary lesion but secondary

to pulmonary disease (5), which would then favor entrance of organisms into the gastric mucosa. This might be the case in the second patient, who had massive pulmonary tuberculosis.

Another possibility, of course, is that the entrance of organisms is entirely independent of a pre-existing gastritis and that the appearance of the gastric mucosa is due to extensive ulceration in the near vicinity. This cannot be excluded by the present material.

These lesions occur in individuals highly sensitive to the tubercle bacillus. This accounts for the necrosis with minimal proliferation in our 3 cases, in 2 of these the high sensitivity being explained by obvious active disease elsewhere. Tuberculin tests were strongly positive in all of the 3 cases.

Two other possibilities might be considered. First, the organisms may enter through an area of acute erosion. There is no evidence to be produced for or against this, the rarity of the lesion perhaps speaking against it. Second, the organisms may lodge and enter through a chronic gastric ulcer. The rarity of the lesion is opposed to this possibility, also, in view of the great number of uncomplicated chronic ulcers occurring in patients with pulmonary tuberculosis. Case IV, however, seems to indicate that the accident may occur, though in this case, rather than a tuberculous ulcer of the stomach, the lesion produced was a chronic gastric ulcer, with evidence of tuberculous infection in the regional lymph nodes.

CLINICAL FEATURES

There is no distinctive clinical picture of gastric tuberculosis. It is well known that patients with active pulmonary tuberculosis have many gastro-intestinal complaints. The most frequent abnormality discoverable is depression of gastric secretion manifested chiefly by hypochlorhydria and achlorhydria (32). Gastroscopy reveals atrophic gastritis frequently and tuberculous infection extremely rarely (7).

In the case histories quoted in the liter-

TABLE II: CLASSIFICATION BASED UPON ROENTGENOLOGIC APPEARANCE IN 49 CASES OF GASTRIC TUBERCULOSIS

Site	Ulcerative	Hyperplastic	Total	References
Generalized	...	1	1	33
Fundus	...	...	...	.....
Body (pars media)	8	5	13	8, 15, 20, 24, 31, our Case I*
Lesser curvature	6	...	...	.....
Greater curvature	...	...	...	.....
Not specified	2	5	7	17, 18, 20, 29, 35, 42,* 47
Antrum	2	12	14	12
Lesser curvature	...	1	1	3, 6, 9
Greater curvature	1	2	3	4, 16,* 22, 26, 33, 35, 36, 39, 46, 51
Not specified	1	9	10	14, 23, 27, 30, 31,* 33, 35, 41, 45,
Pylorus	...	17	17	50, our Cases II and III
Pylorus and duodenum	1	3	4	1, 10, 28
TOTAL	11	38	49	.....

* Our Case 1: Lesser curvature ulcer plus duodenal ulcer, classified as the former.

16. Froehlich: Antral crater plus pyloric obstruction, classified as the former.

31. Ostrum: Lesser curvature ulcer plus pyloric obstruction, classified as the former.

42. Sherman: "Extensive, irregular polypoid mass involving the proximal two-thirds of the stomach ending just below the angularis." Classified as a hyperplastic lesion of the body.

ature it is obvious that gastric tuberculosis mimics gastritis, peptic ulcer, and gastric carcinoma with such symptoms as pain after meals, epigastric discomfort, vomiting, and loss of weight. According to Walters, Kirklin, and Clagett (46), 50 per cent of the patients with gastric tuberculosis have a palpable mass. When present, it would limit the differential diagnosis, for all practical purposes, to gastric carcinoma or gastric tuberculosis. The above authors also state that in 50 per cent of the cases there is evidence of tuberculous infection elsewhere.

Because so many patients with pulmonary tuberculosis have gastric symptoms in the absence of gross pathology and because gastric tuberculosis may exist without pulmonary tuberculosis and with a clinical picture that is non-distinctive, the only examiners capable of suggesting the diagnosis before histopathological examination are the gastroscopist (7) and the roentgenologist.

ROENTGENOLOGIC ASPECTS

All observers agree that there is no characteristic roentgenologic appearance of gastric tuberculosis. The roentgenologic examination usually suggests peptic ulcer, gastric syphilis, or carcinoma. It is stated that gastric tuberculosis and carcinoma of the stomach are associated

in a high percentage of cases (44, 37). White (48) says that 10 per cent of the reported cases of tuberculosis of the stomach have been complicated by gastric carcinoma. Of interest is the observation that in all the cases (since 1917) reviewed by us in which roentgenologic examination was reported, abnormalities were demonstrated (Table II). This suggests that, by the time the patient presents himself with complaints, the pathologic changes are relatively advanced.

In spite of the non-distinctive roentgenologic appearance of gastric tuberculosis, a number of observers have reported features of the examination which may be of assistance in considering this entity. Pop and Hăngănut's (34) 4 patients all showed pyloric obstruction which produced a smooth rounded appearance of the stomach at the site of obstruction rather than an irregular tapering appearance. They thought that this might be characteristic. Renander (36) stated that the presence of relatively good peristaltic waves passing through what appears to be extensive malignant infiltration of the stomach should suggest the possibility of tuberculosis. Ackermann suggested that if a fistulous tract could be demonstrated by roentgen examination, it would assist in the diagnosis of this entity. Of Ostrum's (31) 3 cases, all had multiple

ulcerations and sinus tracts, although only 2 had roentgen examinations, and in these the sinus tracts were not demonstrated roentgenologically. Ackermann also believed that simultaneous involvement of the stomach and duodenum increases the possibility of a tuberculous etiology. The rarity of involvement of both the stomach and duodenum in gastric carcinoma is well known. In the cases of Morris (28) and Cogswell (10), as well as our first case, there was simultaneous involvement of the stomach and duodenum.

To assist in the clarification of the problem as it presents itself to the roentgenologist, we have attempted to collect from the available literature all cases of gastric tuberculosis reported since 1917 in which a roentgenologic examination of the stomach was performed prior to pathological study. Cases discovered at autopsy without previous roentgenologic examination are excluded. Also excluded are cases of co-existing gastric tuberculosis and cancer for the obvious reason that it would be difficult to determine which of the two pathological processes was responsible for the roentgen changes. The number of cases collected is 46, to which we have added our own 3 cases, making a total of 49.

The cases have been tabulated with reference to the site of involvement and roentgenologic appearance. What is labeled "roentgenologic appearance" does not constitute a gross pathological classification, which, as has been discussed, is far more varied; it indicates, rather, those features of the lesion most frequently reported by the examiner. On this basis, the cases may conveniently be divided into a predominantly "ulcerative" and predominantly "hyperplastic" type (12, 31). In the latter, the specimen itself often reveals mucosal ulcerations, but the shallow erosions may not be demonstrated radiologically. Indeed, to quote Palmer (32), "...any single tuberculous lesion in the stomach may present several gross characteristics and its classification in certain cases is a rather arbitrary matter.

Thus, the lesion which is predominantly hypertrophic is often ulcerated as well. It must be emphasized at this point that the tuberculous gastric lesion is one lesion and that it is categorized into gross types, according to its individual peculiarities, merely for diagnostic and pathological convenience."

DISCUSSION

Since to date the treatment for tuberculosis of the stomach has been surgical, a correct preoperative diagnosis has not been imperative. With the discovery of newer drugs, such as streptomycin, which are used in treatment of tuberculous infections of other viscera, a means of establishing the diagnosis without resorting to surgical procedures would appear desirable, though no cases have yet been reported in which gastric tuberculosis has been treated with antibiotics.

It is probable that our first patient had a tuberculous ulcer of the duodenum, which was not resected at the time of surgery, but which did respond to streptomycin in a dosage of 0.5 gm. twice daily for a period of forty-five days. This treatment was followed by a marked improvement in general condition and a gain in weight of 15 pounds. There has been no evidence of recurrence up to the present time. Also the favorable response of tuberculosis of the small intestine to streptomycin suggests that similar results might be expected with gastric lesions.

Roentgenologically the tuberculous ulcer appears similar to chronic gastric ulcers of the usual type. The ulcers are generally penetrating with smooth margins and rolled edges. The majority of them are located in the pars media, 73 per cent as compared to 68 per cent of benign peptic ulcers (25) and 20 per cent of ulcerative carcinomas (19) in this region. Predominantly hyperplastic lesions have occurred more frequently (38 cases as compared to 11 ulcerative cases) in the cases reviewed (Table II). It is probable that ulcers could have been demonstrated in many instances with modern apparatus and compression tech-

nics. Eighty-five per cent of the hyperplastic lesions have occurred distal to the incisura angularis. An ulcer crater was demonstrated in all of our cases. The presence of simultaneous duodenal and gastric lesions has been suggested as favoring the diagnosis. Indeed, one of our patients did have roentgenologic evidence of involvement of both the stomach and duodenum, but this occurs frequently in cases of benign peptic ulcer. Such an involvement would tend to eliminate the consideration of a carcinoma of the stomach, which generally stops at the pyloric ring. The propensity of tuberculous lesions of the gastro-intestinal tract to form sinus tracts and fistulae is well known. This has been found in many cases of gastric tuberculosis, but these tracts have never been demonstrated on roentgenologic examination. Certainly, if an ulcerative or hyperplastic lesion of the stomach is associated with a sinus tract or a fistula, the possibility of tuberculosis should be suspected.

Since a definite diagnosis cannot be made by roentgenologic examination alone, a correlation of the history, physical examination, and roentgen findings must be made. One should be suspicious of gastric tuberculosis in a young patient who has a demonstrable lesion in the stomach which has not responded to conservative management, and who has in addition one or a combination of the following findings: (a) tuberculous infection elsewhere in the body, (b) a strongly positive tuberculin reaction in the absence of demonstrable tuberculosis in other organs, (c) a palpable abdominal mass, (d) roentgenologic evidence of a fistula or sinus, (e) involvement of the stomach and duodenum simultaneously, with contiguity of the lesions. The presence of acid-fast organisms in the gastric contents might conceivably be of aid in establishing the etiologic diagnosis, providing there is no pulmonary tuberculosis. However, the organisms are usually not present in large numbers and are rapidly destroyed by the gastric secretions. One should be par-

ticularly suspicious if any combination of the findings listed above is found in individuals of Negro or Mexican descent. The likelihood is further enhanced by a negative serological test for syphilis, although, of course the two diseases may occur simultaneously.

In a patient who is suspected of having gastric tuberculosis and who has not responded to the routine treatment for peptic ulcer, it is suggested that a therapeutic test be made with streptomycin in adequate dosage for a period of at least three weeks. In view of the excellent results obtained in treating tuberculous enteritis and the apparent favorable response in our first case, it is anticipated that, if due to tuberculosis, the gastric ulcer would become smaller and the hyperplastic infiltrative process would regress.

SUMMARY

1. Three cases of gastric tuberculosis and one case of chronic gastric ulcer secondarily infected by tuberculosis are presented.
2. The etiology, clinical and roentgenologic findings, and the pathogenesis are discussed.
3. The possibility of using streptomycin in adequate dosage as a therapeutic test and for treatment of the lesion, once the diagnosis is established, is suggested.

ACKNOWLEDGMENT: We wish to express our appreciation to the following persons for their permission to publish these cases: Cases No. 1 and 3, Dr. H. G. Bell, Department of Surgery, University of California Hospital, San Francisco; Case No. 2, Dr. C. Mathewson, Jr., and Dr. J. W. Cline, Stanford Surgical Service, San Francisco City and County Hospital, San Francisco; Case No. 4, Dr. Leon Goldman, Department of Surgery, University of California Hospital, San Francisco.

REFERENCES

1. ACKERMANN, A. J.: Roentgenological Study of Gastric Tuberculosis. *Am. J. Roentgenol.* **44**: 59-68, July 1940.
2. BARTNER, W.: Beitrag zur Magentuberkulose. *Berl. klin. Wchnschr.* **57**: 1237, 1920.
3. BIERNATH, P.: Zur Kasuistik der Magentuberkulose. *Deutsche med. Wchnschr.* **47**: 1001, 1921.

4. BINDER, I., RUBY, V. M., AND SHUMAN, B. J.: Tuberculosis of the Stomach with Special Reference to Its Incidence in Children. *Gastroenterology* 5: 474-490, December 1945.
5. BOCKUS, H. L.: *Gastroenterology*, Philadelphia, W. B. Saunders Co., 1943, Vol. I.
6. BROEDERS, A. C.: Tuberculosis of the Stomach, with Report of a Case of Multiple Tuberculous Ulcers. *Surg., Gynec. & Obst.* 25: 490-504, 1917.
7. BROWNE, D. C., MCHARDY, G., AND WILEN, C. J. W.: Gastric Mucosal Changes of Tuberculosis. *Am. J. Digest. Dis.* 9: 407-411, December 1942.
8. CAMERON, O. J.: Gastric Tuberculosis with Report of Two Cases. *Ann. Int. Med.* 2: 1265-1276, June 1929.
9. CHAFFIN, L.: Tuberculosis of Stomach. *Surgery* 5: 186-190, February 1939.
10. COGSWELL, H. D., AND CENNI, L.: Tuberculosis of the Stomach. *Surgery* 27: 145-151, January 1950.
11. COLLINSON, H., AND STEWART, M. J.: Chronic Peptic Ulcer of the Stomach with Acute Miliary Tuberculosis of the Gastric Mucosa. *Brit. J. Surg.* 15: 626-634, April 1928.
12. CONNOLLY, A. E.: Tuberculosis of the Stomach. *Brit. J. Radiol.* 13: 351-353, October 1940.
13. CRAWFORD, P. M., AND SAWYER, H. P.: Intestinal Tuberculosis in 1,400 Autopsies. *Am. Rev. Tuberc.* 30: 568-583, November 1934.
14. DEMEL, R.: Zur Pylorusstenose auf tuberkulöser Basis. *Deutsche Ztschr. f. Chir.* 183: 348-357, 1924.
15. FRIEDMAN, G. A.: Tuberculosis of the Stomach: With Report of a Case of Multiple Miliary Tubercles. *J. A. M. A.* 72: 101, 1919.
16. FROELICH, A.: Cited by Palmer (32).
17. GEUKEN, H. C.: Cited by Renander (36).
18. GIARDINIA, S.: Cited by Renander (36).
19. GOLDEN, R.: *Diagnostic Roentgenology*, New York, Thomas Nelson & Sons, 1947.
20. GOOD, R. W.: Tuberculosis of Stomach: Analysis of Cases Recently Reviewed. *Arch. Surg.* 22: 415-425, March 1931.
21. GUNN, F. D.: Tuberculosis. In Anderson, W. A. D.: *Pathology*, St. Louis, C. V. Mosby Co., 1948, Chapter 11.
22. GUTZEIT, K., AND TEITGE, H.: Cited by Sherman and Johnston (42).
23. HÖFER, R.: Zur Kasuistik der Magentuberkulose. *Beitr. z. klin. Chir.* 126: 555-559, 1922.
24. HURST, A. F.: Chronic Tuberculous Ulcer of Stomach. *Guy's Hosp. Rep.* 75: 428-431, October 1925.
25. IHRE, B. J. E., AND MÜLLER, R.: Gastric and Duodenal Ulcer. Study of 1193 Cases Collected During 1930 to 1940 in Stockholm. *Acta med. Scandinav.* 116: 33-57, 1943.
26. KNOFLACH, J. G., AND PAPE, R.: Ein Fall von polypöser, nicht ulcerierter Magen*uberkulose. *Wien. klin. Wchnschr.* 47: 1288-1290, Oct. 26, 1934.
27. LOGEAI, P. L.: Cited by Palmer (32).
28. MORRIS, H. R.: Gastric Tuberculosis: A Case Report. *Am. J. Roentgenol.* 59: 682-684, May 1948.
29. NICOLO, R.: Cited by Palmer (32).
30. ORSÓS, E.: Operativ geheiltes tuberkulöses Magengeschwür. *Deutsche Ztschr. f. Chir.* 191: 306-314, 1925.
31. OSTRUM, H. W., AND SERBER, W.: Tuberculosis of Stomach and Duodenum. *Am. J. Roentgenol.* 60: 315-322, September 1948.
32. PALMER, E. D.: Tuberculosis of the Stomach and the Stomach in Tuberculosis. *Am. Rev. Tuberc.* 61: 116-130, January 1950.
33. POHL, R.: Cited by Waters, C. A., and Kaplan, I., in *Year Book of Radiology*, Chicago, 1932.
34. POP, A., AND HÄNGÄNUT, M.: Klinische und röntgenologische Betrachtungen über die Tuberkulose des Magens. *Zentralbl. f. Chir.* 59: 1629-1635, July 2, 1932.
35. RENANDER, A.: Einige röntgenologisch beobachtete Fälle von Magentuberkulose. *Acta radiol.* 11: 636-645, 1930.
36. RENANDER, A.: Roentgen Diagnosis of Tuberculosis of Stomach. *Acta radiol.* 18: 851-861, 1937.
37. RENTSCHLER, C. B., AND TRAVIS, R. C.: Sarcoma and Tuberculosis of the Stomach. *J. A. M. A.* 102: 686-688, March 3, 1934.
38. RICH, A. R.: *The Pathogenesis of Tuberculosis*, Springfield, Ill., Charles C Thomas, 1944.
39. ROTHER, R.: Ein Fall primärer Magentuberkulose. *Berl. klin. Wchnschr.* 55: 1049, 1918.
40. SCHINDLER, R.: *Gastritis*, New York, Grune and Stratton, 1947.
41. SEVERIN, J.: Zur Diagnose, Prognose und Therapie der primären Magentuberkulose. *Deutsche med. Wchnschr.* 52: 1168-1170, July 9, 1926.
42. SHERMAN, R. M., AND JOHNSTON, R. L.: Tuberculosis of the Stomach. Case Report. *Gastroenterology* 16: 593-597, November 1950.
43. SPENGLER, G.: Zur Kenntnis der Magentuberkulose. *Med. Klin.* 17: 101-103, 1921.
44. SPRUNT, D. H.: Carcinoma and Tuberculosis of Stomach: Report of a Case with Review of the Literature. *Surg., Gynec. & Obst.* 51: 245-248, August 1930.
45. SULLIVAN, R. C., FRANCONA, N. T., AND KIRSHBAUM, J. D.: Tuberculosis of Stomach; Clinical and Pathological Study. *Ann. Surg.* 112: 225-233, August 1940.
46. WALTERS, W., KIRKLIN, B. R., AND CLAGETT, O. T.: Tuberculosis of Stomach. *Proc. Staff Meet., Mayo Clinic* 11: 83-85, Feb. 5, 1936.
47. WATSON, G. W., FLINT, E. R., AND STEWART, M. J.: Hyperplastic Tuberculosis of the Stomach Causing Hour-glass Deformity, with Complete Squamous Metaplasia of Upper Loculus. *Brit. J. Surg.* 24: 333-340, October 1936.
48. WHITE, R. R.: Simultaneous Carcinoma and Tuberculosis of the Stomach in a Case of Pernicious Anemia. *Proc. Staff Meet., Mayo Clinic* 18: 165-172, June 2, 1943.
49. WILLERDING, H. J.: Über die tuberkulöse Erkrankung des Magens. *Arch. f. klin. Chir.* 128: 109-117, 1924.
50. WINDWER, C.: Tuberculosis of the Stomach. *Rev. Gastroenterol.* 13: 38-41, January-February 1946.

Howard L. Steinbach
University of California Hospital
San Francisco 22, Calif.

SUMARIO

Tuberculosis del Estómago

Después de presentar 3 nuevos casos de tuberculosis gástrica y un caso de úlcera gástrica benigna, infectada secundariamente por bacilos tuberculosos, se repasa

la literatura pertinente. Las tres úlceras tuberculosas discrepaban de la habitual úlcera gástrica en su cronicidad, gran tamaño y ausencia de reacción fibrosa.

Todas se caracterizaban por histólisis masiva que había creado cráteres grandes y profundos. También estaban afectados los ganglios linfáticos regionales.

En la tuberculosis gástrica no hay hallazgos clínicos o radiológicos distintivos. El examen roentgenológico suele sugerir úlcera péptica, sífilis gástrica o carcinoma. En un total de 49 casos (46 recopilados de la literatura y los 3 de los AA.), se describe

el aspecto radiológico como predominantemente ulcerado en 11 y predominantemente hiperplásico en 38. La úlcera es, por lo general, perforante, de bordes lisos y se encuentra comúnmente en la parte media (73 por ciento).

Indícase la posibilidad de usar la estreptomomicina a dosis adecuadas como prueba terapéutica, y para tratamiento de la lesión, una vez establecido el diagnóstico.



Dental Roentgenologic Manifestations of Systemic Disease

III. Granulomatous Disease, Paget's Disease, Acrosclerosis and Others¹

EDWARD C. STAFNE, D.D.S.

Rochester, Minn.

WITH THE PRESENT widespread use of the dental roentgenogram has come an increased opportunity to observe abnormalities of the teeth and their supporting structures which are attributable to systemic disease. As a result, there have been increased understanding and knowledge as to both the recognition and significance of these abnormalities.

Syphilis was one of the first conditions with which definite association of dental abnormalities was established. The most prominent of these were peculiarities of form and size of teeth: the screw driver-shaped crown and notched incisal edge of central incisors described by Hutchinson and the "mulberry molars," both of which may occur in congenital syphilis. The knowledge that an appreciable portion of the crowns of these teeth has formed at one year of age is of value to the clinician. The presence of anomalous crowns can therefore be demonstrated at an early age by means of the roentgenogram, thereby furnishing information which may be of value in differential diagnosis several years prior to the eruption of the teeth.

Diseases which are now known to have an effect upon the teeth and supporting structures are numerous, and include endocrine disturbances, skeletal developmental disturbances of unknown cause, and many others. The diseases dealt with in the following discussion affect primarily the supporting osseous structure of the teeth, yet some of them also present a dental radiographic picture which is frequently characteristic of the disease.

HAND-SCHÜLLER-CHRISTIAN DISEASE

Hand-Schüller-Christian disease is a disturbance of the reticulo-endothelial system,

occurring most often in early life. It combines a triad of symptoms—namely, diabetes insipidus, exophthalmos, and defects in bone, although all the symptoms may not be present in each case. The defects in bone occur most often in the calvaria, jaws, scapulae, pelvis, and ribs, and the oral manifestations of the disease may in some instances be the first to appear. Of 8 cases reported by Kennedy (1) the jaws were involved in 5. Among others who have reported involvement of the jaws are Schaefer and Williams (2) and Austin (3).

The defects in bone are produced by granuloma-like accumulations of connective tissue in which there may be a large number of foam cells loaded with fat. In the jaws of children, the granulomatous tissue has a predilection for forming in the periapical region or dentin papilla of teeth which are undergoing development. With the expansion of the lesions, the alveolar socket or the dental crypt, as the case may be, is destroyed and the partially developed teeth are forced from their original position and exfoliated. In the roentgenogram the exfoliating teeth have the appearance of floating in space, a picture which is distinctive and diagnostic of the disease.

A dental roentgenogram illustrating the typical appearance of Hand-Schüller-Christian disease of children is reproduced in Figure 1. It is that of a boy eight years of age, showing extensive destruction of the alveolar process of the right maxilla and the posterior region of the mandible on both sides. Partially developed permanent teeth as well as primary teeth had been undergoing exfoliation over a period of two years prior to the time the roentgenogram was made. The right

¹ From the Section of Dentistry, Mayo Clinic, Rochester, Minn. Presented in part at the Thirty-seventh Annual Meeting of the Radiological Society of North America, Chicago, Ill., Dec. 2-7, 1951.

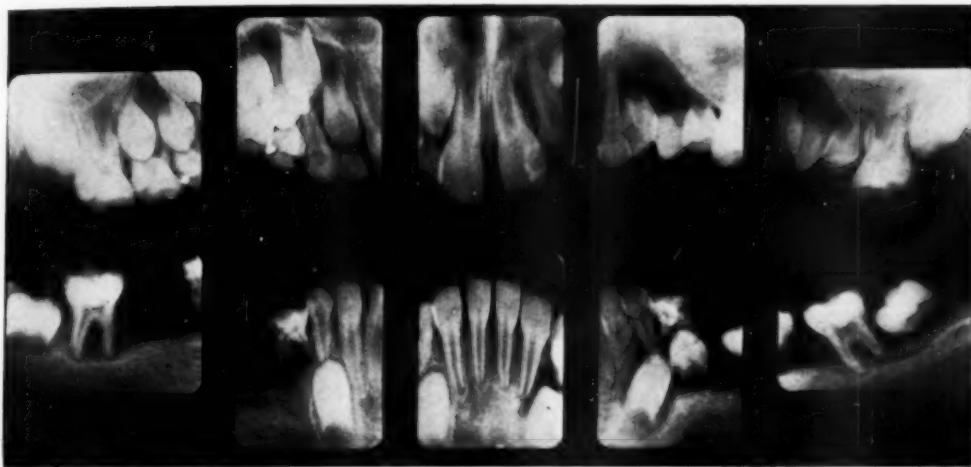


Fig. 1. Hand-Schüller-Christian disease in a boy of eight years. Roentgenogram revealing destruction of the alveolar process in the right maxilla and posterior regions of the mandible. The teeth in the involved regions are being exfoliated, including some which have only partially developed. (Reproduced, with permission, from Stafne, E. C.: *Dental Roentgenologic Aspects of Systemic Disease*. J. Am. Dent. A. 40: 265-283, March 1950.)

maxillary primary molars and the permanent canine and first premolar had been lost. Missing mandibular teeth include both primary second molars and the first and second premolars on the right. Two maxillary and six mandibular teeth on the right are no longer supported by bone and are in the process of being sloughed.

It is possible that roentgen therapy for early lesions of the jaws may be a means of preventing extensive loss of teeth which would occur otherwise, since such therapy has been successful in destroying the lesions which are present in other bones.

EOSINOPHILIC GRANULOMA OF BONE

An eosinophilic granuloma is a destructive lesion in bone consisting of granulomatous tissue. It may be solitary or multiple. It is made up of large accumulations of histiocytes, among which are a variable number of eosinophilic leukocytes. Jaffe and Lichtenstein (4) have suggested that, because of the vast difference in prognosis, the eosinophilic granuloma of bone is a separate entity from other types of histiocytosis, and this concept has also been maintained by Henderson and co-workers (5). There appears to be no systemic reaction to the

disease, and the lesions respond readily to curettage and roentgen therapy. Apparently the incidence of involvement of the jaws is not as great as in Hand-Schüller-Christian disease, in which it is relatively high. Dundon and co-workers (6) found the jaw affected in only 5.5 per cent of 53 cases.

The roentgenographic appearance of the disease as it affects the jaws varies. A solitary lesion may occur in the medullary portion as an oval or round area of rarefaction which may have fairly sharply outlined margins. In other cases erosion of the cortex of the alveolar bone may take place, and as a result the teeth in the involved region are sloughed from their sockets. Dental roentgenograms from a case reported by Kruger, Prickman and Pugh (7), in which this occurred are shown in Figure 2. The patient was a man twenty-five years of age. Figure 2a reveals destruction of the alveolar process in the maxillary right second premolar, and mandibular left molar and incisor regions. During a period of eight months prior to the taking of this film, several teeth had loosened. Healing of the wounds following extraction had been retarded. The roentgenogram reproduced in Figure 2b was made three months after



Fig. 2. Eosinophilic granuloma. (a) Destruction of alveolar process in the right maxillary and mandibular left molar and incisor regions. (b) Three months later: rapid destruction and sloughing of four teeth. (Reproduced, with permission, from Kruger, G. O., Jr., Prickman, L. E., and Pugh, D. G.: *Oral Surg., Oral Med. & Oral Path.* 2: 770, June 1949.)

that shown in Figure 2a. Rapid destruction of bone had taken place, and the maxillary second premolar, mandibular left second premolar, and left incisor teeth were now on the verge of being sloughed. An additional lesion had appeared between the roots of the maxillary left first and second molars.

MULTIPLE MYELOMA

Multiple myeloma is characterized by multiple neoplasms formed from bone-marrow cells of the plasma-cell series. These neoplasms may be widely distributed throughout the skeleton, particularly in the ribs, sternum, skull, clavicles, and spinal column. Pancoast, Pendergrass and Schaeffer (8) have described the roentgenographic appearance of the early stage as one in which small radiolucent regions are confined to bone marrow. When these become more numerous, they coalesce and are manifest as large, irregularly defined regions of radiolucence. The cortex is secondarily involved by direct

extension and invasion, and in some instances an entire bone may be destroyed.

In the jaws there may be a spotty distribution of lesions throughout both maxilla and mandible, but in most instances the mandible only is affected. Here the initial lesions tend to appear in the posterior regions, where the marrow spaces are largest, extending forward along and below the mandibular canal. There is also a tendency to extension up into the marrow spaces of edentulous regions. The roentgenographic appearance of the process in the jaws is variable, and is not diagnostic of the disease. Of several cases with jaw involvement which I have had an opportunity to see, only 2 presented a similar appearance, and in these there was a close resemblance to multilocular cysts or ameloblastomas of the mandible. The dental roentgenogram from one of these cases is shown in Figure 3. The patient was a woman fifty-seven years of age who was suffering from extensive and widespread multiple myeloma which

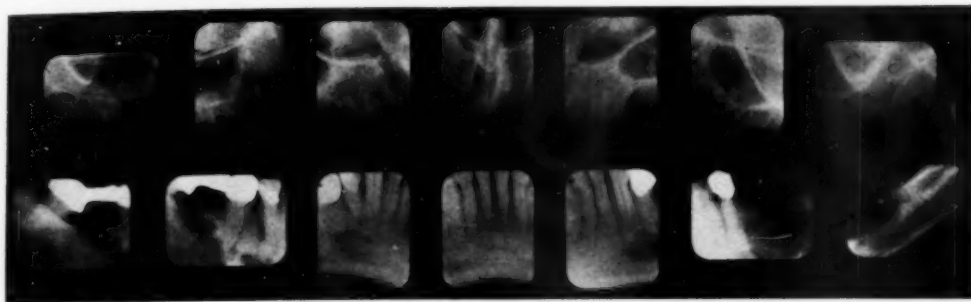


Fig. 3. Multiple myeloma. Bilateral involvement of the mandible, with destruction of bone along the inferior border, extending upward into the edentulous spaces. (Reproduced, with permission, from Stafne, E. C.: *Dental Roentgenologic Aspects of Systemic Disease*. J. Am. Dent. A. 40: 265-283, March 1950.)

followed a fatal course in a relatively short time. The roentgenogram revealed bilateral destruction of bone of the mandible, most extensive in the posterior regions, where it presented the multicystic appearance which is typical of most ameloblastomas.

While bilateral occurrence should suggest generalized skeletal involvement, there are instances in which surgical procedures might be carried out on the assumption that the lesions are local. To avoid such incidents, investigation prior to operation to rule out the presence of generalized disease is indicated.

PAGET'S DISEASE (OSTEITIS DEFORMANS)

Paget's disease or osteitis deformans is a disease of the skeleton which usually occurs after middle life. It may involve one or more bones, and the primary lesion may occur in the maxilla or mandible. The incidence of involvement of the jaw is relatively high, the maxilla being affected most often, and in rare instances both the maxilla and mandible (9).

The dental roentgenographic appearance depends largely upon the stage of development at which the disease is seen. In the early or resorptive stage, the lesion is apparent as a radiolucent area in which there is an alteration of the trabecular pattern into one which has a fine lace-like appearance. This radiolucence is more marked in the periapical regions, and often presents the appearance of pseudocysts on

the roots of the teeth. There is disappearance of the lamina dura in the involved regions and at this time there may also be evidence of variable amounts of resorption of the roots of some of the teeth. This early stage probably is comparable to the stage of osteoporosis circumscripta of the skull which is associated with Paget's disease.

In the advanced stage, when an excessive amount of dense sclerotic bone appears, the roentgenogram reveals alternating areas of osteoporosis and osteosclerosis. This is accounted for by differences in the ratio of osteoblastic to osteoclastic activity, when apposition exceeds resorption of bone as the disease and deformity progress. With the increased osteoblastic activity, there is also deposition of poorly differentiated cementum on the roots of some of the teeth (10, 11). This excess of hyperplastic cementum is peculiar to Paget's disease and, when present, is of value in suggesting a diagnosis. It also serves as a point of differentiation from fibrous dysplasia and other osseous lesions which may involve the maxilla and mandible.

The roentgenogram reproduced in Figure 4 is that of a case in the advanced stage. The patient was a man forty-six years of age who had marked enlargement and deformity of the maxilla of several years duration. The mandible was normal. The roentgenogram reveals alternating areas of osteoporosis and osteosclerosis,

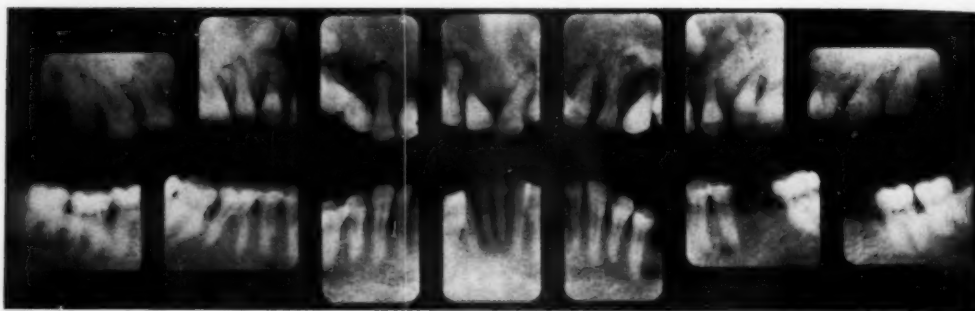


Fig. 4. Paget's disease involving the maxilla, showing alternating regions of osteoporosis and osteosclerosis and the type of hypercementosis which is peculiar to the disease, present on the anterior teeth.

the latter being dominant. The areas of osteoporosis or resorptive activity tend to persist in the periapical regions of the teeth, regions which are no doubt subjected to more stress and strain than are others. This is particularly apparent in the anterior teeth. Because of the marked increase in radiographic density of the bone, the roots of all the teeth cannot be clearly distinguished; however, hypercementosis, which is one of the characteristic features of Paget's disease, can be seen to have involved the roots of the left lateral incisor and the right central and lateral incisor teeth.

ACROSCLEROSIS

Acrosclerosis is a variety of scleroderma which is often associated with Raynaud's disease and involves chiefly the fingers, shoulder girdle, face, and sometimes the mucous membranes of the oral cavity. There is also, in approximately 10 per cent of cases, an abnormal increase in the width of the periodontal membrane space, which presents a dental roentgenographic picture that is apparently peculiar to patients suffering from acrosclerosis and scleroderma (12). The enlarged space tends to surround the entire root of the tooth and is almost uniform in width. Microscopic examination of the periodontal membrane has revealed a notable increase in the size and number of collagenous fibers. There is also thickening of the walls of the vessels, suggesting changes similar to the cutaneous signs of the disease.

The increase in size of the periodontal space is created at the expense of the alveolar socket. There is roentgenographic evidence of resorption and destruction of the wall of the socket, later followed by sclerotic changes in the wall. This is evidenced by a wide radiopaque line which eventually outlines the limits of the enlarged socket. One would suspect, with such an enlarged socket, that the teeth would be loose, but clinical examination reveals that they remain surprisingly firm.

A dental roentgenogram made for a woman twenty-three years of age who was suffering from acrosclerosis is shown in Figure 5. It reveals a widening of the periodontal membrane space of each of the molar and several of the premolar teeth. The change which has taken place appears to have a predilection for the posterior teeth. The walls of some of the alveolar sockets are still undergoing resorption; in others osteosclerosis has taken place to form a new lamina dura which is wider and more radiopaque than normal.

Destruction of the walls of the alveolar socket by periodontitis or periodontosis does not involve the entire socket simultaneously; therefore, the roentgenographic appearance is not similar to that of acrosclerosis, and there should be no confusion between the two conditions. In the event, however, that extensive destruction as a result of periodontal disease has taken place prior to the onset of scleroderma, the characteristic roentgenographic picture would not appear.

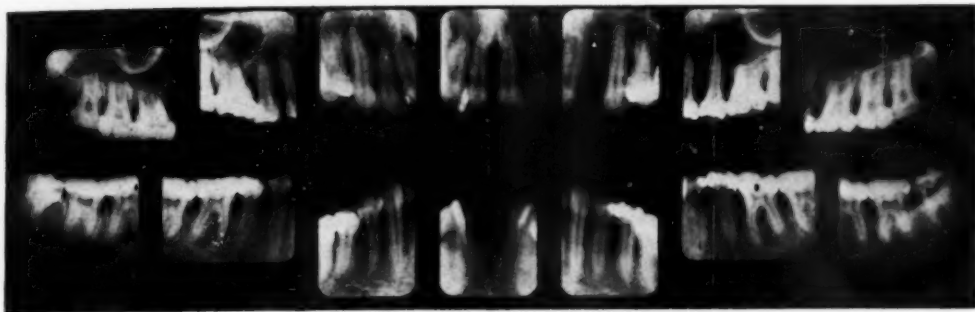


Fig. 5. Acrosclerosis. Abnormal increase in the width of the periodontal membrane space of the molar and premolar teeth, which tends to surround the entire roots of the teeth involved.

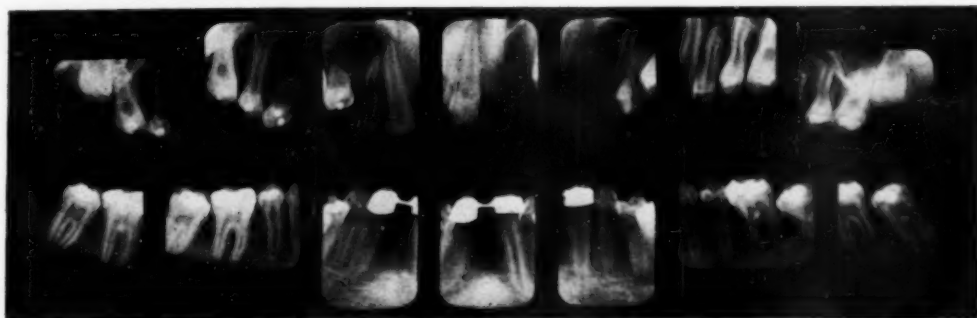


Fig. 6. Rachitis tarda in a boy fifteen years of age undergoing treatment. Osteoporosis, retarded development and eruption of teeth, and hypercalcification of the walls of the pulp canals are revealed. (Courtesy of Dr. S. A. Lovstedt.)

RICKETS

Rickets, a disease of childhood, is caused by lack of vitamin D and sunlight. The function of vitamin D is to maintain the level of calcium and phosphorus in the blood in normal amounts and in a normal ratio. Deficiency of vitamin D affects primarily the growing skeleton. Osteoid tissue fails to undergo proper calcification and the bones remain soft and are prone to bend. Infantile rickets, which has been found by Follis and co-workers (13) to have its greatest incidence between three months and three years of age, often causes dental disturbances. The most common of these is hypoplasia of the enamel. Others are retarded development and eruption of the teeth and malocclusion.

In late rickets (*rachitis tarda*), which occur at about six years of age or later, the dental disturbance is less severe. Hypoplasia of the enamel may be absent,

but retarded development of the roots and malocclusion may be present to a varied degree.

The dental roentgenogram reproduced in Figure 6 was made for a boy fifteen years of age who had shown marked resistance to treatment for rickets. The crowns of the teeth were normal, but the development of the roots of the posterior teeth was decidedly retarded, as evidenced by the large root canals and open foramina. The second molars, which normally undergo eruption at twelve years of age, had not erupted. Even though treatment had been instituted at some time prior to the making of the roentgenogram, there was still generalized osteoporosis of both jaws, which was most pronounced in the maxillary left canine and mandibular right first molar regions. An unusual and peculiar feature is the increased radiographic density of the walls of the pulp chambers

and canals of the posterior teeth. This increased density may be suggestive of hypercalcification of dentin as a result of the administration of rather massive doses of vitamin D.

OSTEOMALACIA

Osteomalacia is a disease of the adult, which may be due to an excessive excretion of calcium from the body, usually by way of the kidneys, or to deficient absorp-

tion of both jaws with absence of the narrow radiopaque lines which depict the border or outline of the maxillary sinuses and nasal fossae. The lamina dura was absent around several teeth and only faintly distinguishable around others. The picture is very similar to one which might be encountered in hyperparathyroidism; however, the investigation made to determine the cause of the osteoporosis of the jaws led to a diagnosis of sprue.

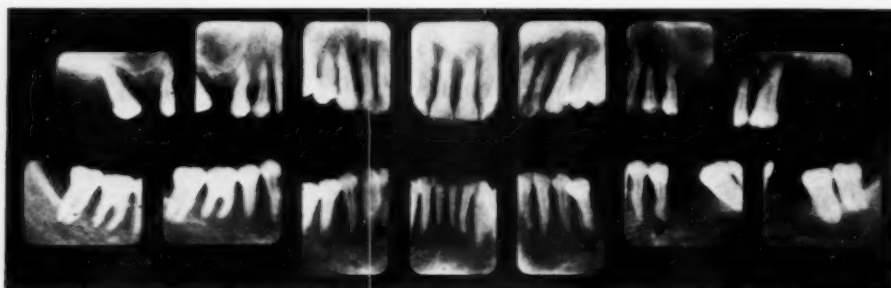


Fig. 7. Osteomalacia due to sprue. Uniform osteoporosis throughout both jaws, with absence of cortical bone and almost complete disappearance of the lamina dura.

tion of calcium from the intestinal tract. There is defective calcification in the bone matrix, which may result in bones consisting predominantly of osteoid tissue. Pugh (14) describes the roentgenographic picture as showing a quite uniform, generalized appearance of decalcification, often with an unusual absence of trabecular structure. The cortex of the bones is thin, and there is lack of subperiosteal resorption. Since the onset of the disease occurs after termination of growth of the skeleton, the teeth are not affected; their osseous support, however, undergoes changes similar to those which occur in other bones.

In sprue, the inability to utilize vitamin D prevents the absorption of calcium from the intestinal tract. Deficient absorption over an extended period of time leads to osteomalacia. A dental roentgenogram which revealed evidence of osteomalacic changes in the jaws of a woman fifty-six years of age suffering from sprue is shown in Figure 7. It revealed uniform osteo-

HEMATOGENOUS OSTEITIS

Hematogenous osteitis is a metastatic infection which produces the typical symptoms of osteomyelitis. It is most often caused by *Staphylococcus aureus* (15). It occurs most frequently in children and adolescents, and its onset may follow injuries, skin infections, measles, scarlet fever, and other childhood diseases. Subsequent to the initial infection, several bones may become involved successively, and often active infection is present in a number of bones simultaneously.

A dental roentgenogram made of a boy sixteen years of age who had osteomyelitis of the mandible of hematogenous origin is shown in Figure 8. The roentgenographic appearance is typical of that seen in osteomyelitis arising from other sources. The entire body of the mandible and the right ramus were involved, the site of greatest destruction of bone being in the anterior region. The initial lesion was an infected blister on the left heel. This was followed in a few days by

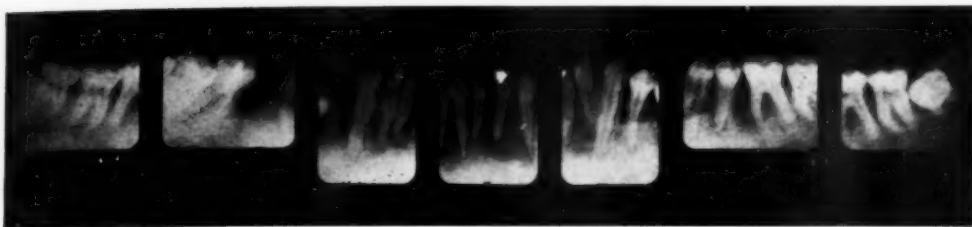


Fig. 8. Osteomyelitis of hematogenous origin involving the mandible and right ramus. The initial lesion was a blister on the heel.



Fig. 9. Radium osteosis involving the bone of both jaws.

an acute osteitis of the fibula, and within a few weeks the left knee, right scapula, ribs, and mandible had become involved successively. The infection of the mandible proved to be the most resistant to treatment.

RADIUM OSTEOSIS

Radioactive substances when taken by mouth may remain permanently in bone and emit radiations which, among other things, produce osteosis and severe leukopenic anemia. The earliest recognized cases of necrosis of bone from this cause were due to a radioactive substance used for the painting of luminous watch dials; in this instance the worker touched the brush containing the material to the tongue. According to Martland (16), Evans (17), and Hoffman (18), resistance to infection in the bone is lowered and osteomyelitis of the jaws, one of the outstanding features of the condition, occurs as a result of super-added bacterial infection from periodontal and periapical disease, which is commonly present. The first case of radium osteosis to be recognized was reported by Blum

(19) in a patient who came to him for treatment of osteomyelitis of the jaws.

When acute and active osteomyelitis occurs, the roentgenographic appearance may be very similar to that of osteomyelitis originating from other sources. In such instances, the occupational history and roentgenograms of other bones should be of aid in arriving at a differential diagnosis.

Evidence of radium osteosis may be present in the dental roentgenogram even though clinical symptoms referable to the disease are absent. The roentgenogram shown in Figure 9 is that of a patient who at the time had no other oral manifestations to suggest the presence of the condition. Irregular areas of destruction of bone were demonstrable throughout both jaws. Bordering some of the areas of destruction there was evidence of condensing osteitis, suggesting an inflammatory process. The condition revealed by the dental roentgenogram led to further investigation of the skeleton, which revealed similar destruction in the pelvic and other bones.

COMMENT

The dentist has an opportunity to observe a large number of cases in which there are roentgenologic manifestations of systemic disease. Some of these patients seek his services first, because involvement of the jaws may be one of the earliest symptoms of the disease. In others early evidence of systemic disease may be revealed by roentgenograms incidental to a dental examination in the absence of any oral complaints referable to the disease. The dentist who refers such patients to the physician for further investigation may be instrumental in bringing about recognition of a disease in its early stages, when it is most amenable to treatment.

From the standpoint of the medical diagnostician, the dental roentgenologic examination may be of value as an aid in the differential diagnosis of several of the conditions discussed; particularly is this true when the dental manifestations, if present, are characteristic, as in Hand-Schüller-Christian disease of childhood, acroscclerosis, and Paget's disease.

The Mayo Clinic
Rochester, Minn.

REFERENCES

1. KENNEDY, R. L. J.: Xanthomatosis; Schüller-Christian's Disease. *Proc. Staff Meet., Mayo Clin.* 13: 776-781, Dec. 7, 1938.
2. SCHAEFER, J. E., AND WILLIAMS, P. E.: Xanthomatosis (Schüller-Christian's Disease). *Dental Cosmos* 74: 879-881, September 1932.
3. AUSTIN, L. T.: Xanthomatosis (Schüller-Christian's Disease); Report of Dental Findings in One Case. *J. Oral Surg.* 4: 209-210, July 1946.
4. JAFFE, H. L., AND LICHTENSTEIN, L.: Eosinophilic Granuloma of Bone; A Condition Affecting One, Several or Many Bones, but Apparently Limited to the Skeleton, and Representing the Mildest Clinical Expression of the Peculiar Inflammatory Histiocytosis Also Underlying Letterer-Siwe Disease and Schüller-Christian Disease. *Arch. Path.* 37: 99-118, February 1944.
5. HENDERSON, E. D., DAHLIN, D. C., AND BICKEL, W. H.: Eosinophilic Granuloma of Bone. *Proc. Staff Meet., Mayo Clin.* 25: 534-541, Sept. 13, 1950.
6. DUNDON, C. C., WILLIAMS, H. A., AND LAIPPLY, T. C.: Eosinophilic Granuloma of Bone. *Radiology* 47: 433-444, November 1946.
7. KRUGER, G. O., JR., PRICKMAN, L. E., AND PUGH, D. G.: So-called Eosinophilic Granuloma of the Ribs and Jaws Associated with Visceral (Pulmonary) Involvement Characteristic of Xanthomatosis. *Oral Surg., Oral Med. and Oral Path.* 2: 770-779, June 1949.
8. PANCOAST, H. K., PENDERGRASS, E. P., AND SCHAEFFER, J. P.: *The Head and Neck in Roentgen Diagnosis.* Springfield, Ill., Charles C Thomas, 1940.
9. STAFNE, E. C.: Paget's Disease Involving the Maxilla and the Mandible; Report of a Case. *J. Oral Surg.* 4: 114-115, April 1946.
10. STAFNE, E. C., AND AUSTIN, L. T.: Study of Dental Roentgenograms in Cases of Paget's Disease (Osteitis Deformans), Osteitis Fibrosa Cystica and Osteoma. *J. Am. Dent. A.* 25: 1202-1214, August 1938.
11. RUSHTON, M. A.: The Dental Tissues in Osteitis Deformans. *Guy's Hosp. Rep.* 88: 163-171, April 1938.
12. STAFNE, E. C., AND AUSTIN, L. T.: A Characteristic Dental Finding in Acroscclerosis and Diffuse Scleroderma. *Am. J. Orthodontics (Oral Surg. Sect.)* 30: 25-29, January 1944.
13. FOLLIS, R. H., JR., JACKSON, D., ELIOT, M. M., AND PARK, E. A.: Prevalence of Rickets in Children Between 2 and 14 Years of Age. *Am. J. Dis. Child.* 66: 1-11, July 1943.
14. PUGH, D. G.: *Roentgenologic Diagnosis of Diseases of Bones.* New York, Thomas Nelson & Sons, 1950-51, pp. 41-43.
15. WEINMANN, J. P., AND SICHER, H.: *Bone and Bones: Fundamentals of Bone Biology.* St. Louis, C. V. Mosby Company, 1947, p. 321.
16. MARTLAND, H. S.: Radium Poisoning. In Cecil, R. L.: *A Textbook of Medicine.* Philadelphia, W. B. Saunders Co., ed. 7, 1947, pp. 582-587.
17. EVANS, R. D.: Radium Poisoning; A Review of Present Knowledge. *Am. J. Pub. Health.* 23: 1017-1023, October 1933.
18. HOFFMAN, F. L.: Radium (Mesothorium) Necrosis. *J. A. M. A.* 85: 961-965, Sept. 26, 1925.
19. BLUM, T.: Osteomyelitis of the Mandible and Maxilla. *J. Am. Dent. A.* 11: 802-805, September 1924.

SUMARIO

Aspectos Odonto-Roentgenológicos de las Afecciones Orgánicas. III. Enfermedad Granulomatosa, Enfermedad de Paget, Acroesclerosis y Otras

En el tercer trabajo de esta serie dedicada a las manifestaciones roentgenológicas de las afecciones orgánicas en la dentadura, discútese los estados que afectan primordialmente el tejido óseo que sostiene los dientes, aunque algunas de ellas presentan además un típico cuadro odontorradiográfico. La enfermedades estudiadas son

la enfermedad de Hand-Schüller-Christian en los niños, el granuloma eosinófilo de los huesos, el mieloma múltiple, la enfermedad de Paget (osteítis deformante), la acroesclerosis, el raquitismo, la osteomalacia, la osteítis hematógena y la osteosis producida por el radio.

En algunos casos, se solicitan primero los

servicios del dentista, por ser la invasión de las mandíbulas uno de los síntomas más tempranos del mal. En otros casos, pueden descubrirse fortuitamente signos incipientes de afección orgánica al hacer un examen dental, sin haber síntomas imputables a la cavidad bucal. El dentista que envía esos enfermos al médico para investigación puede contribuir así decididamente al reconocimiento de una dolencia

en su período incipiente, cuando todavía puede ceder al tratamiento.

Desde el punto de vista del diagnóstico, el examen odontorradiográfico puede resultar útil para la diferenciación de varios de los estados discutidos, en particular si hay presentes típicas manifestaciones dentarias, como sucede en la enfermedad de Hand-Schüller-Christian, laacroesclerosis y la enfermedad de Paget.



Renal Tumors

A Round Table Discussion¹

VINCENT J. O'CONOR, M.D., ABRAM H. CANNON, M.D.,
THOMAS C. LAIPPLY, M. D., KENNETH SOKOL, M. D., AND EARL E. BARTH, M.D.
Chicago, Ill.

Vincent J. O'Connor, M.D.

It is a privilege for a urologist to be here and to collaborate with you in the common diagnostic problems which we face every day. We feel that the teamwork between the urologist, the roentgenologist, and the pathologist represents the important feature of our advancing knowledge in the modern practice of medicine.

The three well recognized cardinal symptoms of renal tumor, in the order of frequency of occurrence, are *hematuria, a palpable mass, and pain in the loin or abdomen*. In modern practice, we add a fourth cardinal sign—probably the most important of all—the outline of the interior of the kidney as demonstrated in the *pyelogram*.

From a diagnostic point of view, we can approach the discussion of this subject in several ways.

Clinically we are most often called upon to differentiate between the various causes of hematuria, especially in the absence of localizing symptoms. If a palpable mass is present, we must try to determine its nature and location. Pain is not a frequent or reliable symptom of renal tumor or cyst and, when present, is not typical unless clots form in the renal pelvis and are passed down the ureter, causing typical "renal colic." In a constantly increasing number of patients seen today in hospital and office practice where an excretion urographic study is done as a part of a complete physical examination, even though the patient has had no symptoms suggesting renal disease, it is surprising how frequently distortion in the outline of the pyelogram, or evidence of delay

in renal function, or an unsuspected hydronephrosis has been discovered. This is an evidence of progress in diagnosis and affords an opportunity for the urologist to advise early and often curative treatment.

TABLE I: DIFFERENTIATION BETWEEN RENAL TUMOR AND OTHER PALPABLE MASSES

Right
Renal tumor
Renal cyst (serous)
Polycystic disease
Adrenal tumor
Retroperitoneal tumor
Echinococcus cyst of kidney and liver
Tumors of ascending colon
Riedel's lobe of the liver
Aneurysm of the aorta
Left
Renal tumor
Renal cyst (serous)
Polycystic disease
Splenomegaly
Cysts in tail of pancreas
Adrenal tumor
Retroperitoneal tumor
Echinococcus cyst in kidney
Tumors of descending colon
Aneurysm of the aorta

Let me emphasize that not infrequently aneurysm of the aorta may cause hematuria, pain in the loin, and suspicious changes in the pyelographic outline. Occasionally an ovarian cyst on a long pedicle may be mistaken for a retroperitoneal tumor.

The oldest and often the most informative method for differentiating the nature of an abdominal mass is *palpation*. This should not be a lost art just because we have the x-ray. In palpating enlarge-

¹ Presented at the Thirty-sixth Annual Meeting of the Radiological Society of North America, Chicago, Ill. Dec. 10-15, 1950. Received for publication in March 1952.

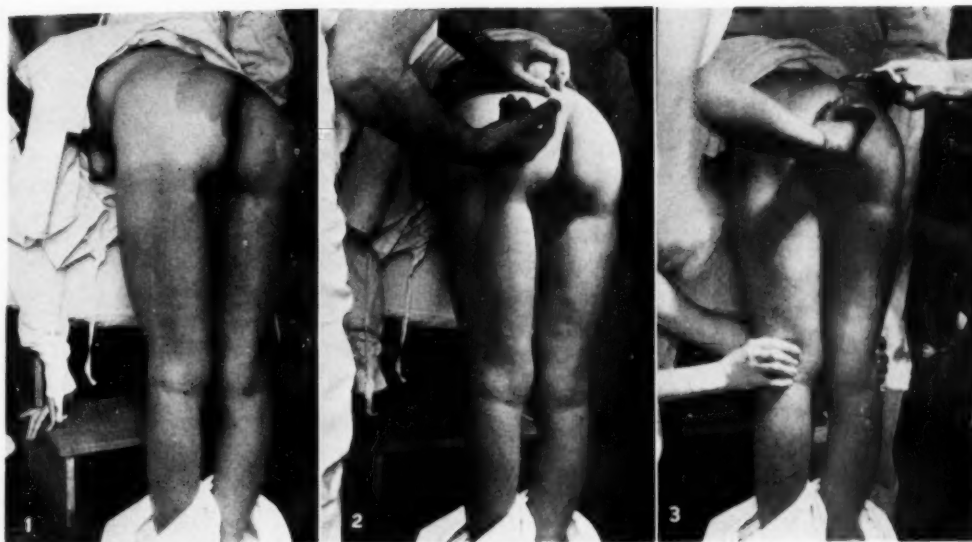


Fig. 1-3. Technic of perirenal air insufflation.

ments or masses within the abdomen or in the loin, the physician can gain a great deal of positive information.

With the patient thoroughly at ease, the abdomen and loin should be palpated bimanually in the recumbent, upright, and lateral positions. Palpation of the abdomen and flanks of the patient when he is standing upright is often helpful.

I should have emphasized before that a careful consideration of the patient's history, to determine the type of hematuria, *total*, *initial*, or *terminal*, is most important.

The next step is pyelographic study, and for this a closer working co-operation should exist between the urologist, the clinician, and the radiologist.

The technic of excretion urography has improved steadily since the original contributions of Swick, von Lichtenberg and Binz. We see many more completely satisfactory excretion urograms than we used to, though there are still frequent instances in which the excretion urogram fails us, making necessary the performance of cystoscopy, ureteral catheterization, and retrograde study. Where there is a differential problem between renal cyst, renal tumor, and retroperitoneal tumor, antero-

posterior exposures must be supplemented by oblique and lateral exposures with the patient in both the recumbent and upright positions.

Perirenal air insufflation is of frequent aid in outlining a retroperitoneal mass. This is often done so as to parallel the urogram. Gastro-intestinal studies with barium ingestion may also include scout films made after rectal injection of air. In some of the confusing diagnostic problems, pneumoperitoneum has been helpful when considered along with the urological study.

We would like to show you very briefly the method which we have recently been using for perirenal air insufflation. It was brought to our attention over a year ago by Dr. James T. Case on his return from South America. It apparently was originated by Dr. Rivas, of Spain. We have performed this procedure in 35 patients without any mishap and in most instances have obtained a great deal of helpful information. With the patient in a modified knee-chest position (Fig. 1), we insert a spinal puncture needle one finger's breadth to the side of the sacrococcygeal junction. The needle is directed toward

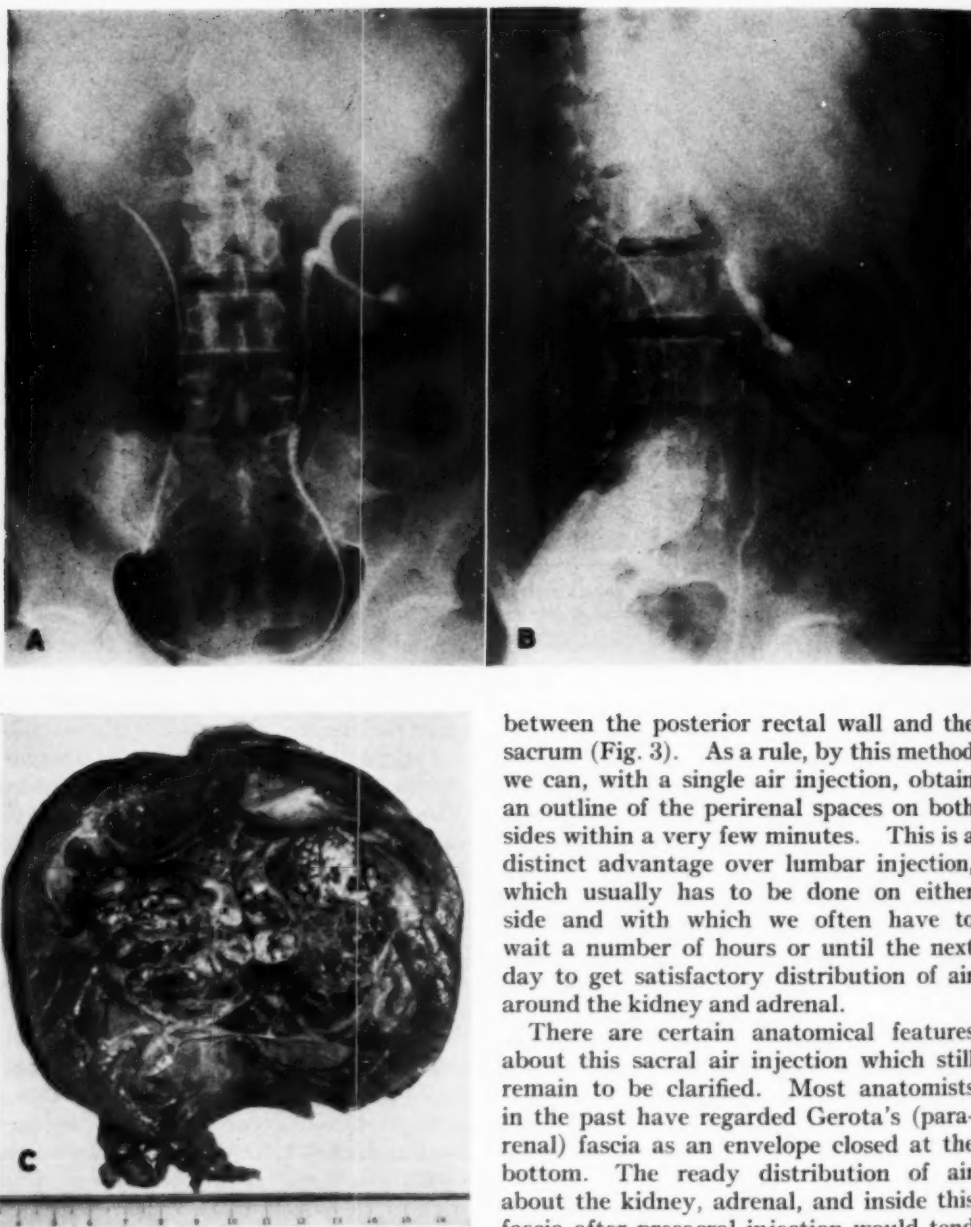


Fig. 4. Case 1: Clear-cell carcinoma. Anteroposterior and lateral films and operative specimen.

the midline, and 400 to 500 c.c. of air are injected in the manner illustrated (Fig. 2). If one is afraid of perforating the rectum, he can insert a finger and feel the needle

between the posterior rectal wall and the sacrum (Fig. 3). As a rule, by this method we can, with a single air injection, obtain an outline of the perirenal spaces on both sides within a very few minutes. This is a distinct advantage over lumbar injection, which usually has to be done on either side and with which we often have to wait a number of hours or until the next day to get satisfactory distribution of air around the kidney and adrenal.

There are certain anatomical features about this sacral air injection which still remain to be clarified. Most anatomists in the past have regarded Gerota's (pararenal) fascia as an envelope closed at the bottom. The ready distribution of air about the kidney, adrenal, and inside this fascia after presacral injection would tend to disprove this contention. On some occasions the air so injected has pervaded the mesentery as well as the retroperitoneal spaces. This has been verified at laparotomy. Work on the anatomy and practical usefulness of this procedure is in progress and we mention it here in the hope

that you will try it and assay your results.
A few illustrative cases follow:

CASE I: A 63-year-old male presented *all four* cardinal symptoms of renal tumor: gross hematuria, pain in the left loin, a palpable mass, rather hard and slightly movable, and a pyelographic outline suggesting an invasive compression and distortion of the renal substance (Fig. 4A). A lateral film (Fig. 4B) suggested a "shelving" and invasive condition more compatible with renal neoplasm than with cyst. The operative specimen (Fig. 4C) showed a central invasive mass—clear-cell carcinoma, or what we used to call hypernephroma. The lung picture in this patient was clear, and he is without apparent recurrence two years after nephrectomy.

CASE II: A woman, aged 43 years, had repeated attacks of gross hematuria, but no palpable mass in the left side and no history of loin, flank, or abdominal pain. Cystoscopic examination revealed a normal bladder; uninfected normal urine was obtained from each kidney, and normal dye excretion from the right kidney but markedly diminished excretion on the left. Retrograde pyelograms showed a normal right kidney but a large soft-tissue mass apparently fusing with the lower pole of the left kidney. The left kidney was very high and there was smooth and complete obliteration of the minor calyces, both middle and lower. The picture suggested a large serous (or solitary) cyst of the lower pole of the kidney rather than neoplasm (Fig. 5A). Figure 5B shows the kidney after surgical removal. An enormous solitary serous cyst had destroyed all except a small rim of renal tissue. No tumor was present.

CASE III: A man, 72 years of age, complained of repeated attacks of gross hematuria and pain localizing to the right loin. A large palpable mass, freely movable, was present in the right flank and abdomen. Scout films revealed obliteration of the right psoas outline and a large homogeneous area blotting out any soft-tissue detail in the region of the right kidney. On cystoscopic examination the bladder appeared normal, and catheterization yielded clear, normal urine from either kidney. The dye output from each kidney was also normal. A left pyelogram showed a normal outline. In the retrograde pyelogram on the right, in the anteroposterior position, the pelvis and calyces appeared elongated, with medial displacement of an enlarged renal shadow (Fig. 6A). An oblique view (Fig. 6B) showed a normal left outline, but on the right a tissue-occupying, smooth, non-encroaching type of contour more suggestive of a large serous cyst than of renal neoplasm. At operation a huge serous cyst attached to a normal kidney was found (Fig. 6C). The cyst wall was resected and the kidney conserved.

CASE IV: A 57-year-old man presented himself because of recurrent pain in the left loin and back. His family physician had palpated a mass in the left

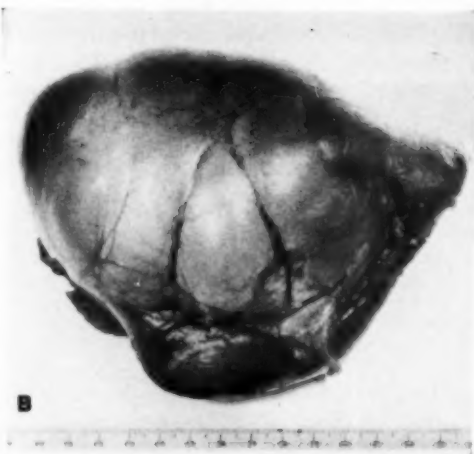
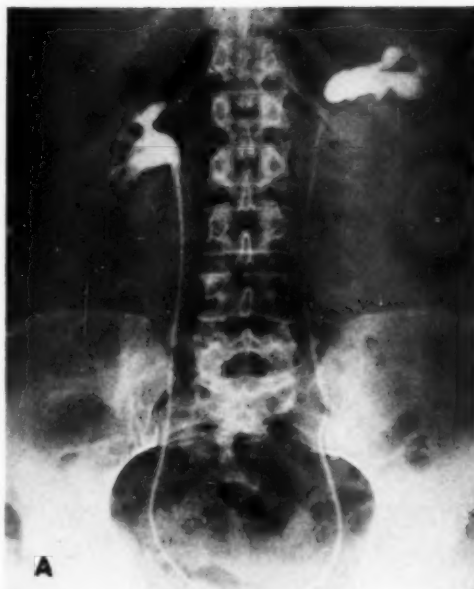


Fig. 5. Case II: Large serous cyst of kidney. Pyelogram and operative specimen.

abdomen. There was no history of urinary difficulty, pyuria, or hematuria. Excretion urograms (Fig. 7A) showed an enlarged left renal shadow, elongated lower pole, distortion and elongation of the middle and inferior calyces. There was no evidence of shelving or infiltration of outline. The tentative diagnosis was probable large serous cyst of left kidney. Figure 7B shows the left kidney with attached cyst delivered from the incision at operation. The cyst was resected and the kidney conserved. No tumor was present.

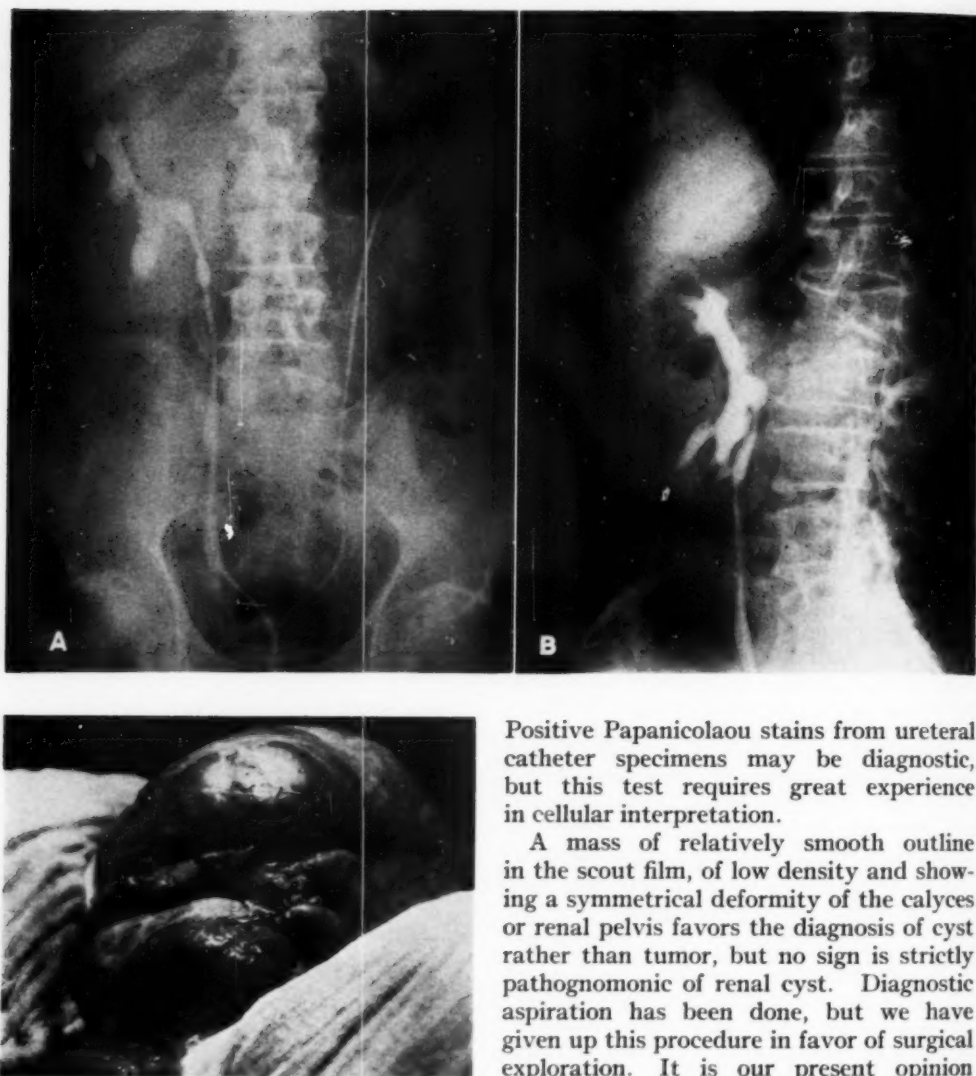


Fig. 6. Case III: Large serous cyst of kidney. Anteroposterior and oblique films and operative view of the cyst delivered from the incision.

In the differential diagnosis between renal tumor and renal cyst we have found pain more common in tumor—20 to 30 per cent as opposed to 5 to 10 per cent. Gross hematuria occurs in about 60 per cent of tumors and in only 20 per cent of cysts. Fever of low-grade unexplained origin is fairly common in patients with renal tumor; it is not found in renal cysts.

Positive Papanicolaou stains from ureteral catheter specimens may be diagnostic, but this test requires great experience in cellular interpretation.

A mass of relatively smooth outline in the scout film, of low density and showing a symmetrical deformity of the calyces or renal pelvis favors the diagnosis of cyst rather than tumor, but no sign is strictly pathognomonic of renal cyst. Diagnostic aspiration has been done, but we have given up this procedure in favor of surgical exploration. It is our present opinion that exploration should be done whenever the pyelographic deformity suggests a space-occupying lesion within the kidney.²

We are not ready to accept lumbar aortography as a common procedure. Its proponents have not yet assembled enough evidence to satisfy us that, when a diagnosis of renal cyst is made as opposed to tumor, it would be safe to withhold surgical exploration.

² Some 20 additional cases presenting diagnostic problems of this kind were discussed and urograms and specimens were shown on the screen.



Fig. 7. Case IV: Large serous cyst of kidney. Excretory urogram and operative view of cyst delivered from the excision.

Dr. Abram H. Cannon, roentgenologist at Wesley Memorial Hospital, will continue this discussion.

Abram H. Cannon, M.D.

As Dr. O'Connor has implied in his discussion, we use both the intravenous and retrograde methods to study renal tumors. Excretory studies are simple to use and provide some indication of the functional capacity of the kidneys. They have been employed by us primarily as scout procedures and are usually supplemented by retrograde examinations to obtain more complete anatomical visualization of the calyces. At times, we find that perirenal air insufflation will outline a mass in the region of the kidney more advantageously than the usual scout films. Oblique views and lateral views are used freely and we have found them to be of great value. Aortography promises to be useful in differentiating cystic lesions and solid tumors of the kidney, but we have had no experience with it.

A summary of the roentgen findings with kidney tumors and with other lesions which simulate kidney tumors is presented in Table I. In 15 to 30 per cent of kidney tumors of the parenchymal type, calcification will be noted. The calcium deposits may be amorphous or may take

the form of streaks or an irregular network scattered in a kidney mass. Tuberculosis is the only other disease process which is frequently associated with parenchymal calcification and the other roentgen findings usually serve for the differentiation. Calcification is uncommon with cysts and, when seen, is curvilinear in type. Irregularity of the margins of elongated and narrowed calyces is usually found with the parenchymal tumors, whereas with cystic lesions the margins of the calyces are smooth, despite marked calyceal spreading and distortion.

In all of these conditions, retrograde studies serve to give better anatomical definition. With infections of the kidney, however, retrograde studies are used only with great caution and preferably not at all.

Despite the differential points outlined in the table, there is still a considerable group of cases in which it is impossible to distinguish between a parenchymal tumor and a cystic lesion of the kidney on the basis of the roentgen examination. In these instances the closest co-operation between the urologist and radiologist is required if a differentiation is to be attempted. Even so, there still exists a group of cases in which an exact diagnosis cannot be made with certainty prior to exploration.

TABLE II: DIFFERENTIAL FEATURES OF TUMORS AND OTHER RENAL LESIONS

	PARENCHYMAL TUMORS	SOLITARY CYSTS	CARBUNCLE OF KIDNEY	TUMORS OF PELVIS	TUBERCULOSIS OF KIDNEY
Enlargement of kidney	Irregular or uniform enlargement	Smooth localized enlargement	Kidney outline obscured. Possible irregular enlargement	None unless parenchymal infiltration is marked	None or only slight enlargement
Calcification of kidney	Present in 15 to 30% in the form of amorphous collections or streaks and irregular networks scattered through tumor	Uncommon. Curvilinear streaks about margin of cyst	None. May be associated calculi	Uncommon. Simulates calculi when seen	Granular or amorphous collections seen in 25 to 30%. Frequently localized to one or other pole
Calyces	Elongation, spreading, narrowing, or obliteration. Possible extravasation of material into tumor; occasional filling defect	Spreading, elongation, narrowing. Possible obliteration; no extravasation; smooth outline	Spreading, narrowing, possible obliteration; erosive changes only with rupture into calyx	Irregular or smooth filling defect; Possible dilatation of calyx proximal to tumor	Irregularity of calyx about papillae; cavity formation about calyx
Infundibula	Elongation, narrowing. Possible filling defect	Spreading, narrowing	Spreading, narrowing	Filling defect, irregular or smooth. Possible dilatation	Narrowing with stricture formation
Pelvis	Elongation, flattening; occasional shortening and rotation	Elongation, narrowing, possible rotation	Seldom marked	Irregular or smooth filling defect. Possible obliteration	May be dilated with ureteral changes
Ureter and bladder	Normal	Normal	Normal	May be filling defects due to metastases	Stricture and irregular dilatations of ureters; shortening of ureters (late); shrinking and fibrosis of bladder (late)
Excretory studies	Decreased excretion usually	Usually normal excretion	Marked decrease or absence of excretion	Usually normal excretion; may be decreased	Usually decreased excretion
Retrograde studies	Confirmatory. Better anatomical definition	Confirmatory	Anatomical definition	Confirmatory	Seldom used, and only with caution

[Dr. Cannon showed several slides of carbuncle of the kidney, parenchymal tumors, and tumors of the kidney pelvis. Cases of renal tuberculosis presenting diagnostic problems in relation to tumors of the kidney pelvis were also discussed. A case demonstrating lymphangitic metastases to the lungs from a clear-cell carcinoma of the kidney was also shown.]

Vincent J. O'Connor, M.D.

Dr. Thomas C. Laipply, Chief of the Pathology Department, Wesley Memorial Hospital, will be the next speaker.

Thomas C. Laipply, M.D.

Tumors of the kidney like those in other organs are either primary or secondary. The following discussion deals only with those of renal origin.

CLASSIFICATION

The primary tumors of the kidney can be classified as follows:

A. Benign

I. Epithelial

1. Adenoma
2. Papilloma

II. Mesenchymal

1. Fibroma
2. Leiomyoma
3. Lipoma
4. Hemangioma
etc.

B. Malignant

I. Epithelial

1. Parenchymal
2. Pelvic

II. Mesenchymal

1. Fibrosarcoma
2. Lymphosarcoma
etc.

III. Mixed

1. Nephroblastoma

ORIGIN AND TERMINOLOGY

The site of origin and the names applied to the primary epithelial tumors of the kidney are indicated in the following outline:

I. From uriniferous tubules of the adult kidney

1. Adenoma
2. Carcinoma (hypernephroma, clear-cell carcinoma, solid-cell carcinoma, Grawitz' tumor)

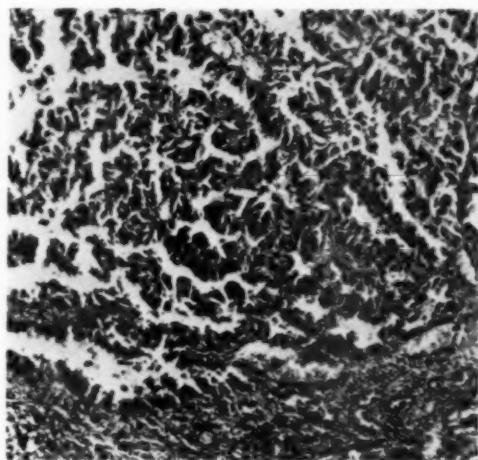


Fig. 8. Photomicrograph of adenoma of renal cortex showing columnar cells and papillae. Hematoxylin and eosin. $\times 60$.

II. From epithelium of renal pelvis and calyces

1. Papilloma (transitional or squamous-cell papilloma)
2. Carcinoma (transitional or squamous-cell carcinoma)

III. From embryonic renal tissue

1. Nephroblastoma (embryonic renal tumor, adenosarcoma, myosarcoma, congenital mixed tumor, embryoma, embryonic nephroma, Wilms' tumor)

BENIGN TUMORS OF KIDNEY

Small nodules of various kinds are common findings in the kidneys at the time of autopsy. These are particularly common in the renal cortical tissue. They include such benign tumors as adenoma, leiomyoma, nodules of adrenal cortical tissue, lipoma, and hemangioma. Such tumors are usually small and rarely reach sufficient size to produce clinical manifestations.

Adenoma of Kidney: The cortical adenomas are the most common of the benign tumors and deserve special comment because of their probable relationship to carcinomas. The adenomas are well defined, but often unencapsulated, spherical nodules, yellow or yellowish-gray in color, and either solid or cystic. They usually vary in size from less than 1 mm. to 20 mm. or more in diameter. They are frequently

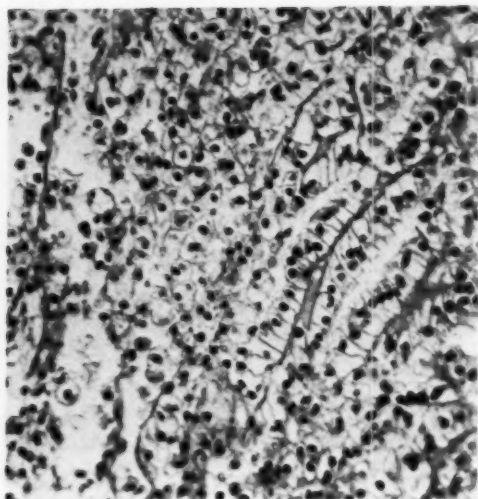


Fig. 9. Photomicrograph of carcinoma of kidney showing clear-cell appearance of cytoplasm and glandular arrangement of tumor cells. Hematoxylin and eosin. $\times 235$.

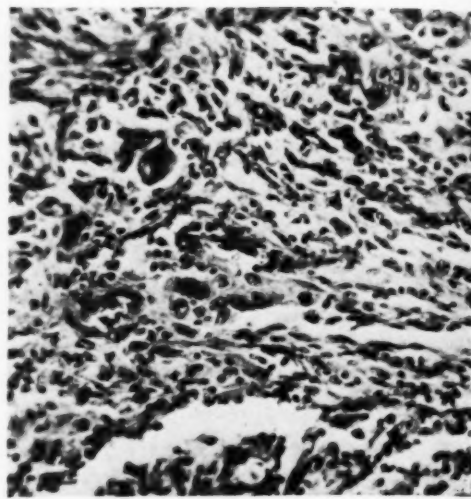


Fig. 10. Photomicrograph of undifferentiated pleomorphic-cell carcinoma of kidney showing markedly atypical nuclei and spindle-shaped cells. Hematoxylin and eosin. $\times 235$.

multiple and often bilateral. Microscopically many of these adenomas show a predominant intracystic papillary structure and are thus sometimes referred to as papilliferous cystadenomas; others have tubular or solid areas. In most of these tumors the epithelial cells are of small cuboidal type (Fig. 8). The small adenomas frequently have no capsules, their marginal cells mingling with the adjacent renal tubules. The larger tumors tend to have fibrous capsules, but these are rarely complete.

Comparison of the structure of renal adenomas and carcinomas leads to the opinion that they are definitely related. Some adenomas cannot be distinguished structurally from well differentiated carcinomas. Many adenomas discovered incidentally at autopsy differ in no demonstrable way from symptomless carcinomas that have produced metastases. Thus in many instances there are no structural criteria which clearly and conclusively separate the two tumors.

CARCINOMA OF THE KIDNEY

The malignant tumor of the renal tubule cells of the adult kidney is the carcinoma

which, because of the wide range in its microscopic structure and varied hypotheses of histogenesis, has been and is still referred to as clear-cell carcinoma, solid-cell carcinoma, hypernephroma, Grawitz' tumor, etc. The terms hypernephroma and Grawitz' tumor, suggesting derivation from adrenal inclusions, are, according to present-day understanding of the structure of the renal carcinomas, based on antiquated views. These terms lead only to unjustified confusion and should be discarded.

The gross appearance of carcinoma of the renal parenchyma is usually characteristic. The tumor is ordinarily soft, with a bulging yellow or orange cut surface. Red foci, due to recent hemorrhage, and cystic spaces secondary to necrosis are common. Compression, distortion, and even invasion of the renal pelvis and calyces are not uncommon. Invasion of large veins is also frequent and by careful search can be demonstrated in the majority of cases. Extension into the main renal vein and even inferior vena cava is not infrequent.

The microscopic structure of carcinoma of the renal parenchyma varies consider-

ably and includes the following types: clear-cell adenocarcinoma (Fig. 9), solid-cell adenocarcinoma, and pleomorphic-cell or spindle-cell carcinoma (Fig. 10) sometimes incorrectly referred to as carcinosarcoma. The most distinctive is the clear-cell variety (Fig. 9). The vacuolated cytoplasm or clear-celled appearance is due to the dissolving out of doubly refractile lipid material by fat solvents used in preparing paraffin sections. In this variant, recognizable acini are usually demonstrable at least in parts of the tumor. Sections taken from the orange or yellow portions of renal carcinomas are most likely to show clear-celled adenocarcinoma. Frequently the clear-celled appearance is sufficiently distinctive to permit identification of the origin of the tumor by a brief glance at a microscopic section.

EPITHELIAL TUMORS OF THE RENAL PELVES AND CALYCES

Transitional epithelium is characteristic of the mucous membrane of the excretory passages of the urinary system from the renal calyces to the urethra. As expected, the primary epithelial tumors of these passages are usually of transitional type. They vary from the well differentiated, non-invasive papilloma to the highly pleomorphic invasive carcinoma. Squamous metaplasia in the tumor may occasionally be sufficiently extensive to warrant the designation of squamous-cell papilloma or squamous-cell carcinoma.

MESENCHYMAL TUMORS OF KIDNEY

The benign tumors of connective tissues are usually of small size and rarely of clinical significance. The malignant mesenchymal tumors of the kidney are like those of other organs. The most frequent sarcoma is lymphosarcoma. The sarcomatous type of Hodgkin's disease and other lymphoblastomas may show extensive renal involvement. The pleomorphic variant of renal carcinoma (Fig. 10), because of the spindle shape of many of the immature epithelial tumor cells, is sometimes erroneously diagnosed carcino-

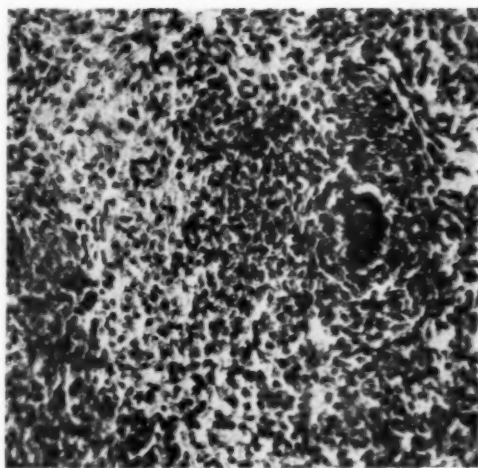


Fig. 11. Photomicrograph of nephroblastoma showing cellular mesenchymal tissue and tubule formation. Hematoxylin and eosin. $\times 220$.

sarcoma. Tumors reported as rhabdomyosarcoma of the kidney are probably variants of the nephroblastoma.

NEPHROBLASTOMA

The embryonic renal tumor is appropriately called nephroblastoma, since it arises from and is made up of tissue like that of the renal blastema. Variations in structure and different ideas as to histogenesis have resulted in many names for this tumor. These include congenital mixed tumor, Wilms' tumor, adenosarcoma, myosarcoma, embryoma, embryonic nephroma, embryonal mixed tumor, and nephroblastoma. Considerable confusion could be avoided if, regardless of the microscopic variations in structure, the one most appropriate term, *i.e.* nephroblastoma, was used in referring to this tumor of rudimentary renal tissue.

Nephroblastoma is usually discovered in infancy or early childhood. In a high proportion of cases it is undoubtedly present at birth. The chief clinical manifestation is swelling of the abdomen due to the large size of the tumor. It is practically always unilateral, sometimes involves the whole kidney, and may reach great size. The characteristic gross

appearance is that of a firm, frequently well encapsulated mass with a variegated yellow and red cut surface. Pale yellow gelatinous foci of myxomatous tissue are frequent and are suggestive of this type of tumor. The microscopic structure varies greatly. In most cases embryonic renal tissue of different degrees of differentiation is relatively abundant. In varying proportions the following are noted: undifferentiated tissue, usually plentiful and resembling embryonic renal tissue (Fig. 11); epithelial structures—including groups of epithelial cells, tubules in various stages of formation (Fig. 11), immature glomeruli, transitional and stratified squamous epithelium; mesenchymal tissue (in addition to undifferentiated tissue there is frequently one or more of the following: fibrous connective tissue, adipose tissue, myxomatous tissue, cartilage, bone, smooth and striated muscle).

These tumors are usually of large size before diagnosis is established. In the majority of cases they prove fatal either because they cannot be excised or because of metastases.

CYSTS OF THE KIDNEY

Cysts of the kidney may be classified as follows:

- A. Acquired cysts
 - I. Retention cysts
 - (a) Single (solitary)
 - (b) Multiple
 - II. Cystic tumors
 - III. Parasitic cysts
 - (a) Echinococcal
 - IV. Pseudocysts
 - (a) Encapsulated abscesses
 - (b) Encapsulated hematomas
 - (c) Encapsulated tuberculomas
- B. Congenital cysts
 - I. Dermoid cysts
 - II. Polycystic disease (congenital cyst-adenoma, multiple cystic kidneys)

Acquired Cysts: The most frequent acquired cysts are multiple, small, thin-walled retention cysts, situated in the outer portion of the renal cortex. These may accompany any chronic renal disease and result from the obstruction of tubules by

fibrous (scar) tissue. Large cysts of similar type, measuring several centimeters in diameter, may result from obstruction of tubules by fibrous tissue or from fibrosis, obstruction, and separation of a minor calyx (hydrocalicosis).

An occasional renal tumor may be cystic in type either because of its inherent cystic nature or because of liquefaction necrosis. Occasionally an adenoma of the kidney is predominantly cystic in character, and rarely such a tumor is large enough to be clinically significant.

Congenital Cysts: Congenital cysts include the rare dermoid cyst and the relatively frequent polycystic disease. The latter is usually bilateral, with cysts of various sizes in both kidneys. In polycystic disease the cysts are distributed throughout the renal parenchyma, in both cortical and medullary portions. The acquired retention or solitary cysts are usually confined to the peripheral part of the kidney and are infrequent in medullary tissue.

Vincent J. O'Connor, M.D.

In the short time remaining, we are going to call on Dr. Kenneth Sokol, Associate in Urology at Northwestern Medical School, and Dr. Earl Barth, Associate Professor of Roentgenology, to wind up this symposium.

Kenneth Sokol, M.D., and Earl Barth, M.D.

Dr. Sokol: We have recently reviewed a series of solitary cysts of the kidney and we find that of 16 patients, 4 had palpable masses and 2 had gross hematuria, in one instance associated with a ureteral calculus. Another patient had microscopic hematuria. Six patients had vague abdominal distress referable to the epigastrium and generalized abdominal distress.

None of the group of 16 patients had typical loin or lumbar pain referable to the kidney. Twelve had deformity of the kidney pelvis, which was found on routine medical examination or through a urological work-up because of urinary symptoms other than the characteristic

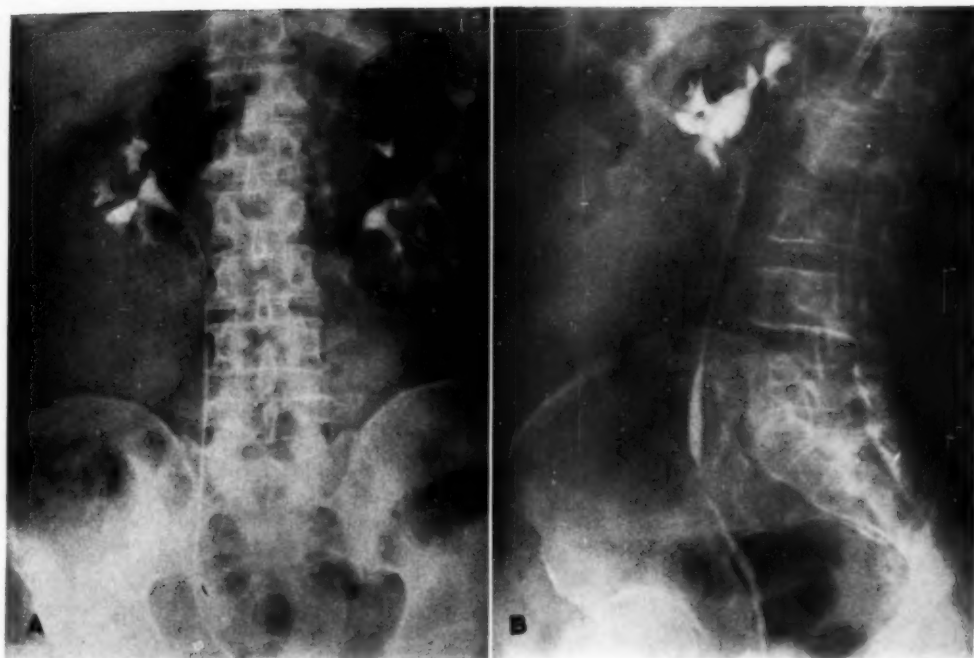


Fig. 12. Large solitary cyst of the lower pole of the kidney.

cardinal signs of hematuria, mass, and pain.

I would like to discuss with Dr. Barth two or three of our cases that have been diagnostic problems.

The first patient, 60 years of age, was admitted to the hospital because of vague abdominal distress, epigastric pain for a period of six weeks. A gastro-intestinal study was done, and the stomach and bowel proved to be negative, but a mass was found in the right side of the abdomen. Urological consultation was requested, and retrograde pyelograms were made. I'd like to ask Dr. Barth's help on these.

Dr. Barth: What we see in the pyelogram (Fig. 12A) is a well defined soft-tissue mass occupying a position at the lower pole of the right kidney, where there is some extrinsic pressure on the pelvis and calyces with no definite evidence of invasion. There is no erosion of the tumor, as such, into the calyceal system. Three possibilities would suggest themselves: first, a solitary cyst of the kidney; second, a renal neoplasm, and finally a retro-

peritoneal tumor. All must be considered, so far as I am concerned, and each must be excluded. In this particular instance, I would say this was a solitary cyst of the kidney.

Dr. Sokol: We have a lateral view on that case, too (Fig. 12B).

Dr. Barth: The mass is located anteriorly. Again we see some pressure against the calyceal system. I don't think I will change my statement.

Dr. Sokol: This patient was operated upon and a large solitary cyst was found in the lower pole of the kidney.

The next patient is a 58-year-old female admitted to the hospital because of fatigue, poor digestion, and a sensation of firmness in the right side of the abdomen. Several examinations had revealed a mass, and it was thought by various examiners to be associated with either the liver or the kidney; one impression was that it might be a large ovarian cyst.

Dr. Barth: Here is very much the same situation we had before, with two varia-



Fig. 13. Carcinoma of the kidney.

tions: a well defined mass occupying the position of the lower pole of the kidney and some displacement of the upper pole of the kidney. I think this is due more to rotation of the kidney than to a separation or spreading of the calyceal system. I should like to point out that the other shadow might well represent the upper pole of a tumor. In this particular instance, we have to consider cystic malignant neoplasm and a retroperitoneal extrarenal tumor. The point here in favor of an extrarenal tumor is that a cyst usually blends with the kidney substance.

Dr. Sokol: This patient was operated upon, and was found to have a large retroperitoneal tumor. It proved to be a neuroblastoma.

Our next patient was a 51-year-old white male, who a year previous to admission to the hospital had noticed that he tired easily and had lost about 20 pounds in weight. He consulted a doctor and was found to be suffering from diabetes and an enlarged heart. Proper

medical management was instituted, and a subsequent examination revealed a palpable mass in the right upper quadrant of the abdomen. Intravenous pyelograms were made, revealing a non-functioning kidney. The patient was then referred for further study, and a retrograde pyelogram was made.

Dr. Barth: Here we see an entirely different situation. We have spread of the calyceal system, and we have some caliectasis. There is a large indefinite shadow, and I find it difficult to determine whether this represents a calcific deposit or a collection of the contrast material. We have a tumor which has undergone some necrosis. Perhaps some of the material has made an entrance into a dilated calyx. My report on this pyelogram was that if the findings were consistent with a cyst of the kidney, a solitary cyst and cancer must be excluded; if the shadow were due to a calcific deposit, then I would favor a diagnosis of solid tumor of the parenchyma.

Dr. Sokol: On removal, the kidney showed a large clear-cell carcinoma.

The last patient whom I would like to discuss is a 52-year-old white female who consulted us because of urinary frequency and nocturia, but she had not passed any blood in the urine. Examination revealed no palpable mass and no pain other than that occasioned by dysuria. A complete urological examination was made, which included a retrograde pyelogram.

Dr. Barth: Here (Fig. 13) we see a marked calyceal spread, similar to that in the previous case, and extrinsic pressure on the calyceal system, but in the gastrointestinal tract we can see shelving and shouldering at the margins of a lesion. It was our impression that this might be malignant, and probably the same findings would prevail in the urinary tract. Where we find a shelving of the infundibula with marked dilatation of the minor calyx, this should lead us to suggest very strongly the possibility of a neoplasm, carcinoma of the kidney.

Dr. Sokol: This kidney was removed

and found to contain a large tumor filling the lower pole.

Edward L. Jenkinson, M.D.

I would like to thank these men very much for coming here and for presenting this material to us. It is teamwork that

leads to a more accurate diagnosis—and these men have been very co-operative—teamwork on the part of the radiologist as well as on the part of the urologist.

Vincent J. O'Connor, M.D.
720 N. Michigan Ave.
Chicago 11, Ill.

SUMARIO

Tumores Renales
(Discusión en Mesa Redonda)

En este debate informal acerca de los nefromas participaron dos urólogos, dos radiólogos y un patólogo.

Los tumores y los quistes renales tienen que ser diferenciados no sólo entre sí, sino también de otros estados. El Dr. O'Connor señaló que el dolor, la hematuria y la febrícula acompañan más frecuentemente a los tumores. Una tumefacción de contornos relativamente lisos en la radiografía despistadora, de poco espesor y que muestre deformidad simétrica de los cálices o la pelvis renal, apoya el diagnóstico de quiste más bien que de tumor, pero ningún signo es absolutamente patognomónico, y está indicada la exploración quirúrgica siempre que el pielograma apunte a una lesión que ocupe espacio dentro del riñón.

El Dr. Cannon también recalcó lo difícil que es, en un grupo numeroso de casos, diferenciar entre un tumor parenquimático y una lesión quística del riñón. Presentó además una tabla de hallazgos roentgenológicos en los tumores renales y en otros estados que pueden simularlos.

Los aspectos anatomopatológicos de los tumores renales fueron discutidos por el Dr. Laipply. Clasificó los tumores benignos en epiteliales (adenoma y papiloma) y mesenquimáticos (fibroma, leiomioma, lipoma, hemangioma). Los tumores malignos comprenden, además de las formas epitelial (parenquimáticos y pelvianos) y mesenquimática (fibrosarcoma, linfoma, etc.), una forma mixta: el nefroblastoma. Los quistes renales pueden ser adquiridos o congénitos. De los adquiridos, los más frecuentes son los múltiples quistecillos por retención, de paredes delgadas, debidos a oclusión de los tubos renales. Los congénitos comprenden el raro quiste dermoideo y la relativamente frecuente afección poliquística.

Al cerrar el debate, el Dr. Sokol y el Dr. Barth, representando, respectivamente, las especialidades urológica y radiológica, presentaron casos que ilustraban algunos de los problemas diagnósticos confrontados.



Determination of Individual Enlargement of the Ventricles

Method Based on Angiocardiography in the Left Anterior Oblique Position¹

JORGE CEBALLOS, M.D.,² and JAIRO ISAZA B., M.D.³

THERE ARE numerous methods of cardiac measurement, but almost all of them are deficient in one respect: they indicate general enlargement of the heart and are therefore useful only for demonstration of cardiomegaly that modifies all the cavities at the time of examination.

level of the left middle arch and a double contour of the right inferior arch, to be seen in the postero-anterior film.

Lengthening of the right inferior arch in the postero-anterior view is one of the signs of *right auricular enlargement*. The enlarged auricle will also be visible in the

TABLE I: FIFTEEN CASES STUDIED ANGIOCARDIOGRAPHICALLY

No.	Sex	Age (years)	Blood Pressure	Clinical Diagnosis	EKG Diagnosis
1	M	1	?	Under observation	Right bundle block
2	F	7	95/45	Patent ductus	.....
3	F	7	80/20	Patent ductus	Hypertrophy of left ventricle
4	M	7	120/70	Coarctation of aorta	Hypertrophy of left ventricle and left auricle
5	F	9	104/70	Interventricular septal defect	Within normal limits
6	M	10	100/60	Interventricular septal defect	Left ventricle hypertrophy; right bundle block
7	M	12	105/60	Interventricular septal defect	Borderline EKG
8	M	15	100/55	Interventricular septal defect	Within normal limits
9	F	17	94/48	Patent ductus	.....
10	F	21	165/60	Patent ductus; coarctation of the aorta	Hypertrophy of left ventricle
11	F	21	120/70	Patent ductus	Within normal limits
12	F	25	195/100	Coarctation of aorta	.....
13	M	26	100/90	Coarctation of aorta	Hypertrophy of left ventricle; myocardial lesions
14	F	33	85/55	Mitral lesion	Hypertrophy of left auricle and right and left ventricles
15	F	55	200/110	Pulmonary emphysema, arteriosclerosis, hypertensive heart	Left auricular and left ventricular hypertrophy; myocardial lesions

Since the different diseases that affect the heart frequently produce selective enlargement of a single chamber in the beginning, it is of importance to know how to recognize such a change.

Demonstration of *enlargement of the left auricle* is based on the following well known features: elevation of the left main bronchus as a result of the upward enlargement of the chamber, demonstrable in the postero-anterior and left anterior oblique projections; posterior displacement of the barium-filled esophagus when there is backward bulging of the auricle, seen in the right anterior oblique view; and frequently abnormal prominence at the

lower portion of the cardiac contour, in a right anterior oblique projection. In some cases it will produce unusual lengthening of the anterosuperior contour demonstrable in the left anterior oblique view.

There would seem, therefore, to be sufficient data for radiologic evaluation of the auricular cavities. This is not true of the ventricles.

The *right ventricle* plays no part in the contour of the cardiac shadow as seen in the postero-anterior view except when there is tremendous enlargement. In that event it may appear in the middle or inferior arch on the left side. The convexity of the middle arch, as has been demon-

¹ Accepted for publication in October 1951.

² Radiologist, El Instituto Nacional de Cardiología de México (on leave); Teaching Fellow, University of Texas, Medical Branch.

³ Resident, El Instituto Nacional de Cardiología de México.

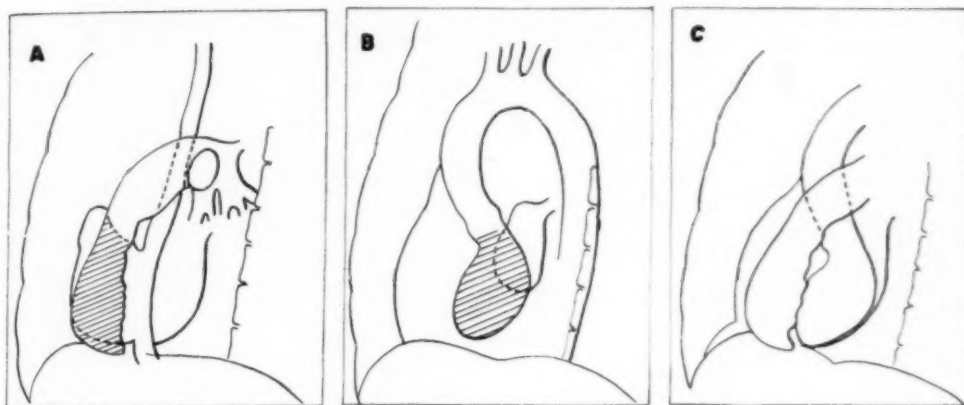


Fig. 1. A. Dextroangiocardiogram. B. Levoangiocardiogram. C. Combined dextro- and levoangiocardiogram. (After Dotter and Steinberg)

strated by Chavez, Dorbecker, and Celis (1), is normally formed by the main pulmonary artery or its left branch; it may be formed by the left auricle when the latter is unusually enlarged to the left. There may thus be confusion in the interpretation of the postero-anterior film. In both oblique views, the right ventricle forms the anterior contour of the cardiac silhouette, and its enlargement is indicated by changes in its convexity toward the anterior thoracic wall.

The *left ventricle*, as seen in the postero-anterior view, constitutes the left inferior arch in the contour of the heart, and lengthening of this arch indicates left ventricular enlargement. In borderline cases, however, and with the transverse type of heart, this feature is difficult to evaluate. In the right anterior oblique view, when the degree of obliquity is minimal, the left ventricle forms part of the anterior contour; otherwise it lies behind the right ventricle. In the left anterior oblique view the left ventricle constitutes the lower portion of the posterior contour, and its enlargement is said to be related to the clear space between the vertebral column and the heart, or, as Taussig has suggested (2), to the degree of obliquity necessary to separate the heart from the spine. These methods of estimating left ventricular enlargement have several disadvantages:

(1) Variations occur in shape and posi-

tion of the heart, which may be vertical, oblique, or transverse. In the vertical heart it will be impossible, or at least very difficult, to evaluate slight ventricular enlargement on the basis of the convexity toward the anterior thoracic wall or vertebral bodies, as this will be minimal. In turn, a transverse heart in an otherwise normal person may overlap the vertebral column and still be normal.

(2) The varying degrees of obliquity in which films are taken, depending upon the personal judgment of the fluoroscopist or the technician, will also contribute to the diagnostic problem.

In the daily fluoroscopic studies performed at the National Institute of Cardiology of Mexico since its establishment, one of us has noted the difficulty of differentiating the normal from the slightly enlarged left ventricle in obese patients with a transverse position of the heart.

Fray (3), in a study of 73 cases checked at autopsy, found a method for mensuration of the heart and chest based on the establishment of the interventricular septum in the left postero-anterior oblique film. Our method also makes use of the interventricular septum, which, according to Dorbecker and Deschamps (4), Dotter and Steinberg (5), and our own experience in 15 cases studied angiocardio graphically (Table I), can be demonstrated in the left anterior oblique view. In Figure 1,

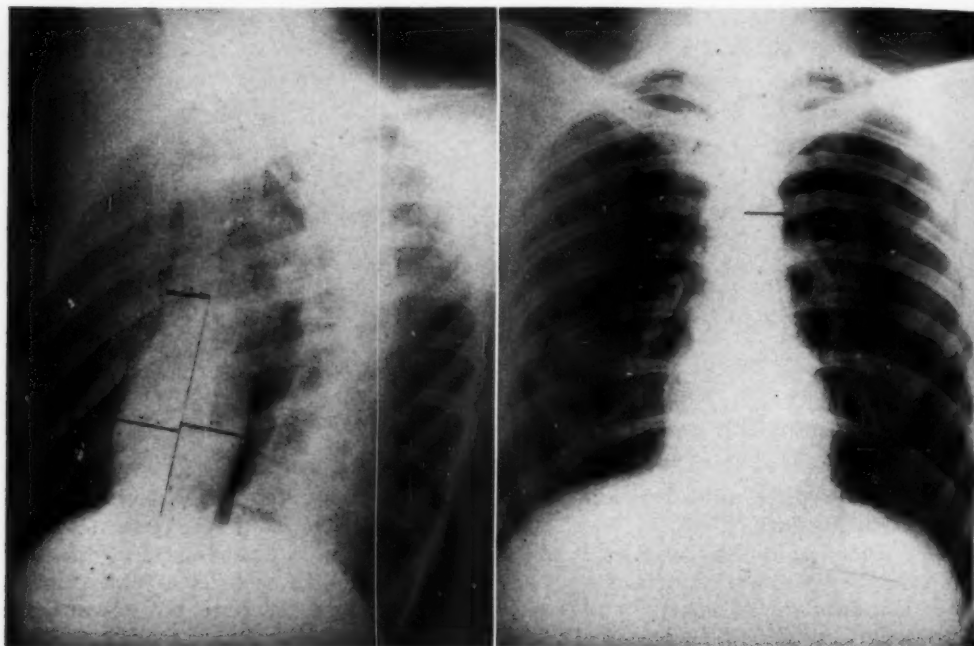


Fig. 2. Vertical heart. Technic for measuring ventricles in left anterior oblique and postero-anterior views.

drawn from data presented by Dotter and Steinberg on the basis of 600 angiocardio-graphic studies, A represents the dextro-angiocardiogram and B the levoangiocardiogram; in C the two are combined and—as was observed in our angiocardio-grams—the interventricular septum is seen to divide the heart in two parts, the right ventricle forward and the left ventricle backward. We may add that we have observed that the direction of the septum follows the major axis of the heart and will vary with the cardiac shape (Figs. 2-4). In the angiocardio-gram represented in Figure 5, if we project the septum superiorly, we will see that it is in alignment with the posterior border of the ascending aorta. At its lower end it is slightly curved to terminate in the interventricular groove, generally accepted as the division between the right and left ventricle.

On the basis of these features, we have the necessary data for finding the inter-ventricular septum, either fluoroscopically or on the film, in the left anterior oblique position. In fluoroscopy it will suffice to

turn the patient enough to visualize the posterior margin of the aorta. This cannot always be identified on the roentgeno-gram, and in that event we have first to measure the aortic diameter in the postero-anterior view from the barium-filled esophagus or the air-filled trachea to the outer border of the aortic knob. We may then locate the posterior border of the aorta in the left anterior oblique view by measuring its diameter from the anterior portion, which is always visible as it emerges from the cardiac shadow in this projection. Once we have localized the septum, we trace two perpendicular lines to reach the cardiac shadow in its most convex part. The anterior one will represent the width of the right ventricle, and the posterior that of the left ventricle (Figs. 2-4).

We have studied 100 cases, 40 of which were normal and 60 abnormal. Of the abnormal cases, 50 showed enlargement of the left ventricle and 10 of the right. Table II shows only minimal differences between the ventricles, never more than

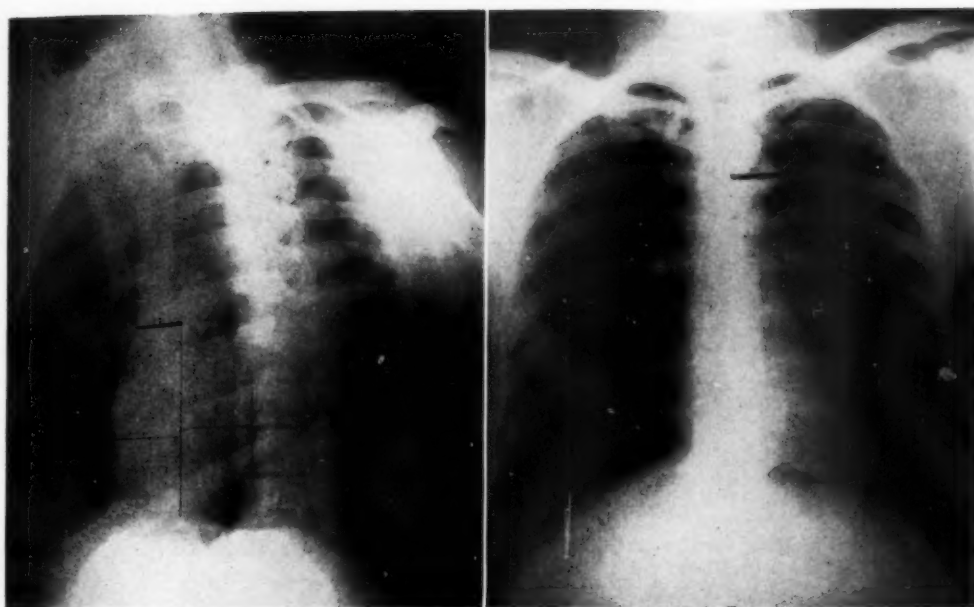


Fig. 3. Vertical heart. Left anterior oblique and postero-anterior views.

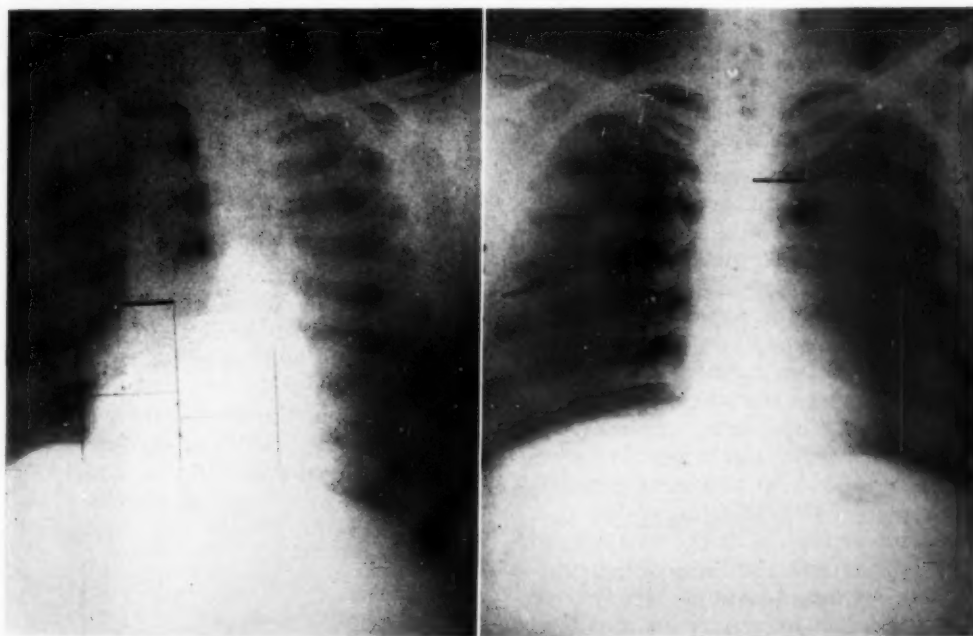


Fig. 4. Transverse heart. Left anterior oblique and postero-anterior views.



Fig. 5. Dextro- and levoangiocardigram, showing method of measurement.

TABLE II: MINIMAL DIFFERENCES IN VENTRICLES IN FORTY NORMAL HEARTS

No. Cases	Difference in Size of Ventricles
11	None
7	1 mm.
8	2 mm.
5	3 mm.

3 mm. The average for all the cases was 0.145 cm.

Table III represents the findings in those cases with left ventricular enlargement. In no case were the ventricular measurements the same. There were 21 cases with slight enlargement, 12 with moderate enlargement, and 17 with definite enlargement. The average difference is 2.158 cm. and favors the left ventricle as the chamber affected.

Table IV shows again that there were no cases in which the measurement of the ventricles was the same. There were 5 cases with slight right ventricular enlargement and 5 with moderate enlargement.

We believe that, with the data set forth in the tables and the facts demonstrated by the angiocardigraphic studies previously referred to, we are justified in the following conclusions:

(1) The method described for measuring individual ventricular enlargement based

TABLE III: PREDOMINANT LEFT VENTRICLE ENLARGEMENT: FIFTY CASES

No. Cases	Difference in Size of Ventricles
0	None
0	0 to 5 mm.
21	5 to 15 mm.
12	15 to 25 mm.
17	More than 25 mm.

TABLE IV: PREDOMINANT RIGHT VENTRICLE ENLARGEMENT: TEN CASES

No. Cases	Difference in Size of Ventricles
0	None
0	0 to 5 mm.
5	5 to 15 mm.
5	15 to 25 mm.

upon the position of the interventricular septum and relating it to the posterior border of the aorta is satisfactory both in routine fluoroscopy (left anterior oblique) and in teleradiographs in the postero-anterior and left anterior oblique projections, the former being used to measure the aortic diameter.

(2) The procedure is especially useful for demonstrating slight enlargement of the ventricles. Once one has become acquainted with the method, it is not necessary to perform actual measurement but is sufficient to observe the heart during fluoroscopy in the obliquity necessary to visualize the aorta clearly in the left anterior oblique position.

(3) The method should not be used independently of other findings. It complements observations as to the shape, position, and characteristic contour of the heart as shown in other views.

(4) Since the method is based upon the normal position of the interventricular septum, it cannot be used in those diseases that modify the position of the septum, as Bernheim's syndrome, or in congenital heart disease with abnormal position of the aorta. It is of greater use in acquired heart disease.

SUMMARY

A method for individual measurement of the ventricles is presented. It is based upon the position of the interventricular

septum and its relation to the ascending aorta as demonstrated in the left anterior oblique projection. The accuracy of the method proved to be satisfactory in 100 cases, 60 of which were abnormal, 50 with left ventricular enlargement and 10 with right ventricular enlargement.

Santa Margarita No. 317
Colonia del Valle
México, D. F.

REFERENCES

1. CHAVEZ, I., DORBECKER, N., AND CELIS, A.: Valor diagnóstico de los angiocardigramas obtenidos

por inyección directa intracardiaca a través de una sonda. Arch. Inst. Cardiol. México. 17: 121-154, April 30, 1947.

2. TAUSSIG, H. B.: Congenital Malformations of the Heart. New York, The Commonwealth Fund, 1947, p. 31.

3. FRAY, W. W.: Mensuration of Heart and Chest in the Left Posteroanterior Oblique Position: Comparative Study, Determination of Type of Cardiac Enlargement (Right or Left). Am. J. Roentgenol. 27: 363-372, March 1932.

4. DORBECKER CASASUS, N., AND DESCHAMPS, J.: Las cavidades derechas, la arteria pulmonar y el tabique interventricular desde el punto de vista angiocardiógráfico. Arch. Inst. Cardiol. México. 19: 187-233, April 30, 1949.

5. DOTTER, C. T., AND STEINBERG, I.: Angiocardio-graphic Interpretation. Radiology 53: 513-517, October 1949.

SUMARIO

Determinación de la Hipertrofia de los Distintos Ventrículos: Técnica Basada en la Angiocardiografía en la Posición Oblicua Anterior Izquierda

La técnica presentada permite medir por separado los ventrículos. Básiase en la posición del tabique interventricular y en la relación del mismo con la aorta ascendente según revela la angiocardiógrafía en

la proyección oblicua anterior izquierda. El método mostró su exactitud en 100 casos, 60 de los cuales eran anómalos: 50 con hipertrofia del ventrículo izquierdo y 10 con hipertrofia del derecho.



The Organization of the Computer System of X-Ray Case Planning at the Lincolnshire Radiotherapy Centre¹

DUNCAN D. LINDSAY, M.A.

PLANNING THE details of multi-field x-ray therapy in a given case, if it is to meet the ideal requirements, involves a great deal more time than it is possible for the average radiotherapist or physicist to give to such tasks. The computer system to be described here makes possible a close approach to the ideal at a low cost.

There is no question that tumour doses are already carefully planned in many radiotherapy centres. The object of the system to be presented is to provide more complete planning and to allow for fuller investigation of individual cases. It is desirable that full dose contours be drawn and recorded in at least one plane for every case, and that these should be shown in relation to the various organs involved. Many times it is of value to have the dose contours plotted in other planes as well, as for example parallel to the principal plane, but near the limits of the tumour. A record of the integral dose administered is of some value, and certainly the maximum, minimum, and mean tumour doses should be recorded, and the positive and negative variation of the tumour dose about the mean value should be shown.

Whether or not a uniform dose throughout the tumour volume is desired, it is essential that the radiotherapist specify exactly what he is prescribing and that means to achieve his aim be carefully planned and recorded. Case planning is the first step in the execution of a given prescription. The doses in healthy tissue and the maximum skin dose should be calculated and recorded, as well as the dose in any special region in which the radiotherapist may be interested. These data are automatically available if the full dose con-

tours in several planes are completed. Yet another phase of ideal case planning is the making of due allowance for the gross effect of certain disuniformities in the tissue, such as masses of bone, fat, or air. Further, an ideal case plan would take account of the doses delivered to the microscopic canals in bone, which, as shown by Spiers (1), may be very different from the normally computed dose. If all this could be done, and if, finally, the dose contours could be drawn in energy units, so that the true energy absorption in different tissues could be plotted, then it might be said that the ideal in case planning had been achieved.

THE COMPUTER SYSTEM

Case planning details are largely a matter of mathematics, which is normally a function of the physicist rather than of the physician, though the latter must prescribe and indicate biological and anatomical requirements. At the Lincolnshire Radiotherapy Centre, therefore, all case planning is done in the Physics Department, the more time-consuming aspects being entrusted to "computers," or junior mathematical assistants, who are well qualified for the arithmetical work involved.

At a Centre where the total number of malignant cases treated each year is about 1,000, two computers have been found to be adequate; even at the largest Centres four would probably be enough. Their work is done under the control of a clinical physicist who maintains close liaison with the radiotherapist. The minimum British qualification for the position of computer is considered to be a good school certificate² with a special credit in mathematics. A natural aptitude for arithmetical pro-

¹ From the Lincolnshire Radiotherapy Centre, Memorial Hospital, Scunthorpe, England. Accepted for publication in June 1951.

² A school certificate in Great Britain is taken on the completion of a secondary school course, usually at the age of about seventeen. With sufficiently high credit, this exempts the holder from "Matriculation" or university entrance examinations.

CASE SET-UP FORM

Name _____ Site _____ Date _____

t = _____ cm. X = _____ to _____ x _____ cm. Y = _____ to _____ x _____ cm.

FIELD	A	F S D.	W	X	Y	-	I
1							
2							
3							
4							
5							
6							
7							
8							

Fig. 1. Case set-up form.

cedures, a sense of responsibility, and an appreciation of the importance of the work are essential. In general, it has been found that young women of eighteen to twenty-one make the best computers, as the position affords no prospects of advancement to a higher grade in radiotherapy and offers no long-term career.

With two capable computers, the physicists and radiotherapists need devote only a small percentage of their time to case planning. The radiotherapist provides the necessary information as to body contours and tumour contours and general directions as to the doses to be achieved, the organs to be avoided, and the skin tolerance. The physicist need only specify multi-field set-ups for trial and improvement and carry out certain minimum checking operations. The efficiency of two computers working in conjunction is far more than double that of one working alone, on account of the nature of the work. The computers can also be of great value in the calculations arising in research and development projects. In particular, they can be trained to calculate x-ray isodose charts and the dose rates at points near arrangements of radium needles, especially if some calculating de-

vice, such as that described by Mitchell (3), can be made available.

It may be well to present a brief general outline of the procedure, and then take up the individual steps in greater detail. The system works best when one physicist supervises the computers and a special room is allocated to case planning. The patient is first seen by the radiotherapist and the clinical physicist together, so that there can be no misunderstanding about the body contour taken or the general nature of the case. The radiotherapist then provides a drawing of the required body and tumour contours on a treatment-planning sheet (see pp. 852-853), on which he also writes the required tumour dose, the permissible healthy tissue dose, the permissible skin dose, and any other directions. The case is then taken over by the Physics Department. The physicist decides on a trial selection of fields, positions, angles, and intensities, which he specifies on a set-up form (Fig. 1). The work is then passed on to the computers, who proceed to the calculation. If, on examining the result, the physicist is not satisfied that the plan provides the optimum treatment for the particular case, he

TREATMENT PLANNING SHEET

NAME

SITE

No.

1. CLINICAL REQUIREMENTS.

- (i) The relevant body contour and tumour contour, with orientation shewn, must be marked on this sheet. Areas to be avoided must be indicated. An approximate indication of the desired distribution may be shewn. Separate "Treatment Planning Sheets" must be used for separate sites in one patient.

- (ii) General description of treatment required at this site:—

- (iii) Required average tumour dose..... r

Max. allowable skin dose..... r

Signature of Therapist

Max. allowable internal non-tumour dose..... r

Max. allowable volume dose..... megam.r.

Required number of treatments.....

Date.....

2. PLANNED TREATMENT. (To be filled in by Physicist)

- (i) Details of planned X-ray treatment

Field No.	Position	Size	Fsd.	Angle	Kv.	Added Filters	Ma.	Total Incid.	No. of Treats	r/per Treat	App. Output	Time per Treat	Total Time

Mean Tumour Dose per Treatment..... r

Volume Dose per Treatment..... megam.r.

- (ii) Details of planned radium treatment.

- (a) Intracavitary.

- (b) Interstitial.

- (c) Mould.

The relevant body contours, the tumour bearing area, the geometrical arrangement of the X-ray field and/or radium containers the dose contours due to this and any other radiation treatment, must be shewn on this sheet.

Signature of Physicist..... Checked by..... Date.....

3. POSITIONING OF TREATMENT AREAS ON PATIENT.

4. FINAL TREATMENT SUMMARY. (TO BE FILLED IN AFTER COMPLETION OF TREATMENT).

(i)	Average Tumour Dose	
	Minimum Tumour Dose	
	Maximum Tumour Dose	
	Maximum Skin Dose	
	Maximum Internal Non-Tumour Dose	
	Volume Dose	

For sites of maxima and minima, see diagram.

(ii) Time intensity factors.

Tumour X-ray dose =	r, delivered over	days, in	fractions, each of	r, at	r/min.
Tumour Radium dose =	r, delivered over	days, in	fractions, each of	r, at	r/hour

(iii) Notes.

Signature of Physician _____ Checked by _____ Date _____

furnishes a new set-up of fields and the process is repeated until the ideal is obtained. The dose contours are then drawn by the computers and traced on the planning sheet. If, for any reason, the isodose contours in another plane are required, further sheets showing these contours can be calculated and drawn, and any further improvements can be incorporated as they may be suggested by the calculations. A rough value for the integral dose for each case can be rapidly obtained from the isodose charts used at this Centre and the total can be calculated by the computers and recorded for each case. The physicist checks the drawing of the dose contours and the dose totals at four or five individual points. He then specifies the technical factors on the planning sheet, and passes the whole case plan to the radiographers² for execution and to the radiotherapist for marking the treatment areas on the patient.

It is hoped that eventually dose totals may be converted into energy units and presented in that form. The computer system has considerable value even if it is used merely to obtain the most routine information, but its greatest value probably lies in the potentialities which it provides for the routine attainment of full information on energy released in each part of each patient, once mathematical methods have been devised for achieving such results.

Successful case planning is very much a matter of experience, and the clinical physicist who supervises this work has a great advantage in this respect. With the work of planning thus provided for, the radiotherapist is free to concentrate on the medical aspects of treatment. There is greater assurance, also, that any case which needs individual planning will receive the

necessary attention, as it will not involve the radiotherapist in unwelcome chores. Furthermore, if the physicist sees any possibility of improved treatment by use of applicators in sizes not immediately available, or by provision of any other special parts, he will be prepared to obtain these promptly for the individual case, as he usually has the facilities at hand for their construction. At this Centre, all applicators are made locally, and any new size can be manufactured, tested, calibrated, and put into service within twenty-four hours. Case planning in the Physics Department need not involve any loss of clinical touch, for a close liaison should be maintained between the radiotherapist, physicist, and computers, so that mutual advice may be obtained, at any stage of the planning procedure.

Body and Tumour Contours: In taking the body contours, it is of vital importance that those limiting the applicator position be the ones which are drawn. At this Centre, for instance, in order to insure reproducibility of treatments, it is a convention to allow no compression of tissue by the applicators. In the great majority of cases, the applicator faces are arranged to be parallel to the central axis of the body "cylinder." That is to say, the applicator face is not allowed to follow the slope of the chest or back, but is limited by the part which is most prominent when the patient is in the treatment position. Particularly in head and neck cases, the question of position of the patient and plane of the applicator during treatment and contour drawing can be subject to serious misunderstanding. It is for this reason that it is regarded as essential that the clinical physicist be present when the radiotherapist draws the contours.

The tumour volume to be drawn on a case-planning sheet is defined as that part of the body area which is expected to contain malignant cells. It is not sufficient to show simply the shape of the region primarily involved. An adequate margin must be included to ensure that all malignant cells are well within the specified area

² In Britain, a therapy radiographer is a man or woman trained to a good degree of understanding of the medical, physical, and electrical engineering aspects of radiation treatments. The radiographer is not qualified until he has passed an examination, including physics, after a course of theoretical and practical instruction extending over a minimum of two years. He is then expected to be largely responsible for the execution of the treatments specified by the radiotherapist and physicist.

and that any small errors in radiotherapy do not vitiate the effect of the treatment. The tumour contour as drawn by the radiotherapist is normally that in the mid-plane of the length of the applicator to be used. If there is an important variation or anything requiring special attention in any other plane, a separate drawing should be made.

Body Sections: The clinical physicist and the computers work in a room whose walls are lined with a complete set of pictures of the sections of the human body; these show the full anatomy at every inch from the thighs to the top of the head. The radiotherapist identifies the position of the tumour contour among these body sections, and the physicist then, knowing the length of the applicators to be used, is able to see exactly through which region any proposed beams of x-ray will pass, and to make note of any large masses of bone, air cavities, etc., which must be taken into consideration. The physicist can, of course, scale up the organs to suit the dimensions of the particular patient and he can allow for any individual abnormalities.

Isodose Charts: The physicist has available a full set of transparent isodose charts covering every applicator possessed by the Centre. The number tends to be large after some years of accurate individual case planning, especially as new applicators are made from time to time to meet the needs of individual cases. The isodose charts are all calculated by the method of Meredith and Neary (4) and show not only the dose lines, but the width of the penumbra and the dose lines within it. A line on one side of the chart, parallel to the central depth line, shows the integral dose due to absorption, to any given depth. This is charted for 1 r incident, on the assumption that the whole of the primary beam passes through average human tissue down to the depth concerned. The integral dose values are calculated from Mayneord's (5) formula. Although the formula is regarded by its author as only a rough approximation, it makes possible this simplified charting procedure. The whole subject of integral

dose is still so indefinite that the most useful method is felt to be one which enables a rough estimate to be made, with ease and speed, on every patient. In the case of some fields, of course, there is an appreciable bolused gap between one side of the applicator and the tissue surface. A rough allowance is made for this in calculating total integral dose.

Treatment Planning Sheets: The treatment planning sheet consists of one sheet folded to form four pages. The middle two pages, on which the radiotherapist draws the body and tumour contours, are ruled in 1-cm. squares. Pages 1 and 4, which are reproduced here, furnish a useful record to be included in the patient's case notes. The final planned treatment, with consequent dose contours, is shown on the ruled squares when the work of planning is completed.

Set-Up Forms: With the prescriptions and drawings on the treatment planning sheet before him, and aided by adequate anatomical data from the body sections and his own experience of this particular work, the physicist is then in a position to test, on paper, a first trial arrangement of fields. He usually does this by examining a few points with the transparent isodose charts and specifying the proposed fields on a special set-up form (Fig. 1). As the length of the fields to be used and the quality of the radiation are generally specified by the radiotherapist, the physicist has available five degrees of freedom in making his choice of fields, *i.e.*, the number of fields, the width of each, the rectangular co-ordinates of a given point on each field, the angle of each field, and the intensity of each beam. It is usual to choose a point at the centre of the paper as the origin of the system of rectangular co-ordinates, with X and Y values specifying the centre of the applicator face. To avoid confusion, the angle is always measured from the northward pointing vertical.

Calculating Paper: When the set-up form has been completed, it is passed to the two computers, who redraw the body and tumour contours on a sheet of ordinary

graph paper, labelling rows and columns at 2-cm. intervals, with letters and numbers, in the usual manner. One of the computers places the first transparent isodose chart on the drawing and reads off the percentages at every point on the 2-cm. matrix, while the other writes these down on a sheet of special calculation paper printed in large sheets and cut to the appropriate length and breadth for the particular case. Each major rectangle on the calculating paper represents one point on the matrix, and a column of eight minor rectangles allows the doses to be recorded for that point, for any number of fields up to eight. Two further columns of minor rectangles are included in each major rectangle, in case further trial set-ups may involve only minimal alterations, such as a change in one field. When the figures are all recorded on the calculating paper, it takes only a little time for the second computer to add up the columns within each major rectangle and call out the sums to the first computer, who records them on her own diagram. This is then returned to the physicist for approval or for such alterations as he may deem advisable.

In order to facilitate the speedy computation of fields which have an incident percentage other than 100, *i.e.*, fields for which the number of roentgens delivered at the applicator is not the same as for other fields, the computers have a stock of "percentage sheets," on each of which is tabulated a given percentage of every fifth number from 30 to 120. Thus, when a field having an odd incident percentage is being computed, the first computer simply calls out the full value from the isodose chart, while the second, with a percentage chart before her, records the actual value on the calculating paper. After the computations are completed, the clinical physicist quite independently checks about five points which, with the general run of the dose contour lines, are usually enough to satisfy him that the computation is in order.

Dose Contours: The dose contours are then drawn on the graph paper by one of the computers and labelled accordingly.

In cases which are symmetrical about the Y axis, time is saved by drawing only half of the contour. This is traced back onto the treatment planning sheet. When the final array of fields is accepted by the physicist, the computer records, on the same sheet of graph paper, the maximum tumour dose, minimum tumour dose, mean arithmetical dose, variation as a percentage of the mean, maximum non-tumour dose, and maximum skin dose. She is then able to equate the mean tumour percentage with the prescribed tumour dose from the treatment-planning sheet and thus list the percentages corresponding to doses from 0 to 5,000 r at intervals of 500 r. All the dose contours can then be drawn in. If there is the slightest doubt about the plan being acceptable to the radiotherapists, they are consulted at this stage.

Integral Dose: The computer also calculates the actual incident dose for each field and marks it on the graph paper at the entry port of the field. She is then able to place the isodose charts, one by one, in their appropriate positions, read off the integral dose, and multiply by the incident dose, recording these figures on the back of the graph paper and summing, to record the total integral dose.

Treatment Instructions: It is now possible for the second section of the treatment-planning sheet to be completed, and this is done by the computers, who refer to the physicist for specifications of kilovoltage, added filtration, and milliamperage. They also copy the treatment instructions onto the detailed treatment record for the radiographers' use, and mark the location of the fields on Part 3 of the treatment planning sheet with the usual rubber stamps. A final check is made by a physicist who has not been involved in the calculation in any way. The clinical physicist usually discusses the complete plan with the radiographers, so that any special points may be given the necessary attention.

COMBINED CASES

Cases which involve the use of intracavitary radium in conjunction with multi-

field x-ray techniques, such as cervix cases, which are treated at this Centre by the Walker (6) method, can be put through the hands of computers in exactly the same way. A set of transparent isodose charts for all the commonly used arrangements of radium is kept for this purpose. Radium dose charts are normally drawn up for the midplane of the x-ray fields, although charts in other planes may be provided. It is found preferable to draw up the radium charts in the form of numbers at 2-cm. intervals rather than to attempt to draw isodose lines. The total effect of doses from both x-rays and radium is obtained, and the resulting contours are the ones to be shown on the treatment-planning sheet. In order to do this a certain ratio between the effectiveness of x-roentgens and the effectiveness of gamma-roentgens must be assumed. Our choice has been 1.6 gamma-roentgens = 1 x-roentgen (h.v.l. 1.5 mm. Cu).

TWO-FIELD SET-UPS

A two-field set-up is often a simple one and does not demand special planning. Many cases, however, which to a non-mathematician will at first sight seem to be simple and to call for but two fields, prove actually to be most difficult and would much better be referred to the computing section immediately. This is commonly the case with fairly large tumours which extend up to the skin surface. In point of fact, these represent quite the most awkward group of cases on which to obtain a fully satisfactory set of dose contours. It is rarely possible to treat them with only two fields, and careful planning is needed. One group of cases to which two-field treatments are applicable are breast cancers referred for postoperative irradiation. At this Centre the Edinburgh technique is used, with a double two-field set-up: two tangential fields over the chest wall and two opposed fields in the axilla and supraclavicular region. Here the number of variables is so small that it has been possible to draw up a semistandard list of rules for setting up the fields and it seems un-

necessary that each case go through the computing section. There is much to be said, however, in favor of the computer system even for these cases, merely to obtain a definite dose plot for the chest wall and the axillary and supraclavicular region for each set of case notes.

SUPERFICIAL CASES

Superficial lesions constitute another group in which the apparent simplicity of treatment planning is responsible for a great deal of unnecessary confusion. It is all too easy to assume that the superficial tumour has a negligible depth and also to neglect the lateral variations in dose, as well as such factors as incomplete back-scattering volume. It is fairly common practice in such cases to record simply the central surface dose, which may be quite different from the true mean tumour dose. Worse still, the ratio of true mean tumour dose to central surface dose varies considerably from case to case, so that the recorded figures do not even furnish a good arbitrary basis on which to compare treatments. It is well worth while putting all superficial cases through the case-planning section, so that body contour, tumour contour, and dose contours may be drawn and true mean tumour dose recorded. Only when this practice is followed will comparison of published doses be valid.

OBLIQUE FIELDS

In general the cases for which treatment is planned at this particular Centre have the central rays of each beam all in the same plane. There are occasions, however, where oblique fields would be of value and a fully organized computer system makes this benefit available to the patient. In this connection, the dose contour projector recently designed by Howarth (8) is of considerable value.

TISSUE DISUNIFORMITIES

There is at present no satisfactory method of allowing for bone, air, or fat during theoretical dose planning. It is doubtful if there ever will be, as the subject is one

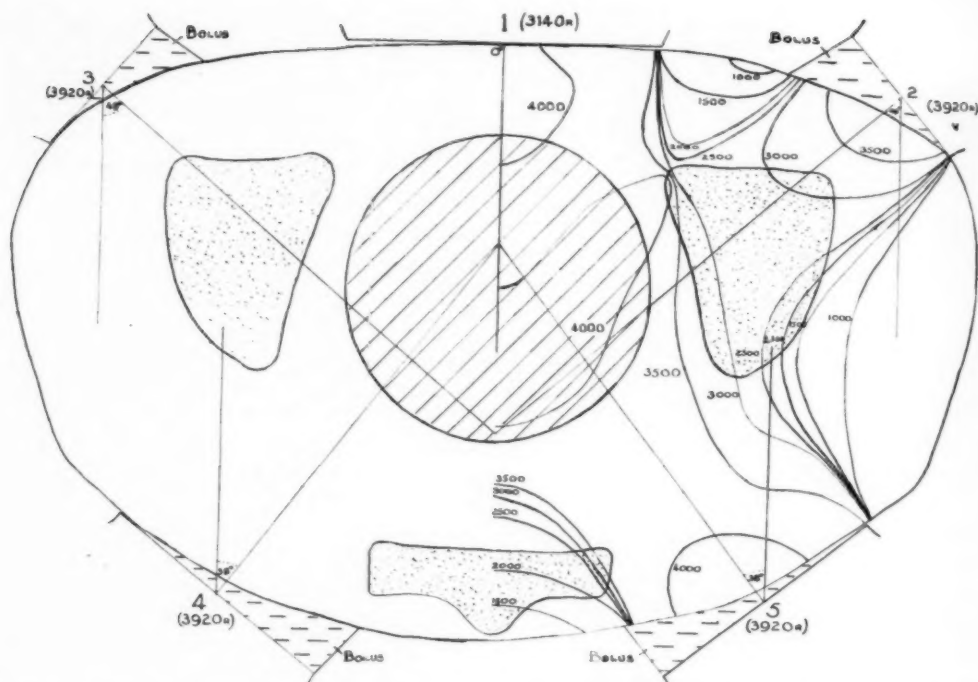


Fig. 2. Whole bladder irradiation which would have attained 4,000 r mean tumour dose if no bone had been present: the contours are those obtained by neglecting bone and other tissue disuniformities.

of great complexity. All that can be said is that when any large volume of bone, fat, or air, interferes with the path of the primary beams, some attempt should be made to allow for the effect. As Spiers (2) has shown, this is more important at the low kilovoltages common in deep therapy today. If and when all deep therapy is done with beams having energies in the million-electron-volt range, this problem will be minimized. In the meantime, it is certainly not worth while attempting long and complicated processes that require an altogether disproportionate share of the time of the treatment-planning section. The rough methods suggested below should be adequate.

Bone Allowance: Bone allowance is complicated enough in the case of a single body section, since different thicknesses of bone intervene in different parts of the primary beam. When, however, one examines parallel body sections, away from the central plane of the applicators, the problem

becomes even more difficult. Only a very rough allowance is justified. The method described by Spiers is employed and the doses at points beyond the bone mass are multiplied by the factor $e^{-\delta\mu t}$ where $\delta\mu$ is the difference between the absorption coefficients of water and bone at the quality used, and t is the thickness of bone between the tube target and the point for which calculations are being made. It is appreciated that this method is far from accurate, even when a slab of bone of uniform thickness is being considered: it is far more open to criticism when actual bone shapes are involved. Nevertheless, it is better than neglecting bone absorption altogether.

Figure 2 shows a typical case plan for a bladder treatment without bone allowance, while Figure 3 shows the same case with very crude bone allowance, using a beam of h.v.l. 5 mm. Cu and 50 cm. F.S.D. The sections are in the central plane of the applicators.

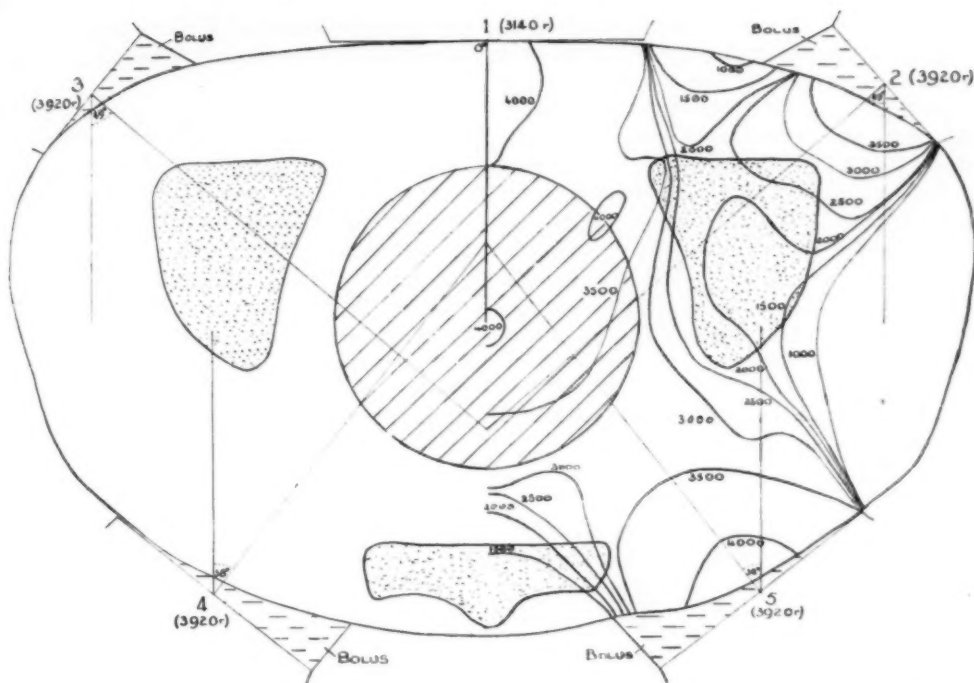


Fig. 3. Whole bladder irradiation which would have attained 4,000 r mean tumour dose if no bone had been present: the contours show that the mean tumour dose is more like 3,500 r after allowance for bone absorption has been made.

Air and Fat Allowance. It is probable that no large volumes of air, other than the lungs, are worth consideration; even there, in some cases, the air effect may be balanced by the bone effect of the ribs.

Allowance for fat is easier to make, as the only fat worth considering is that just below the skin surface and it can generally be treated as a layer of uniform thickness. Even in normal persons it is worth considering when planning treatments for trunk sites, while in obese persons the effect may be considerable. It is, of course, an effect in the right direction and may result sometimes in an apparently impossible large patient proving quite treatable.

MECHANICAL BEAM DIRECTION

Whenever a case which involves mechanical beam direction is being planned, the mould room personnel is automatically involved as another group for close liaison. It is desirable that the mould room tech-

nicians be familiar with the procedure of case planning. If it can be arranged, it is useful to have each of them take part in the computation and drawing work on a few cases, so that complete understanding between the two sections is established.

In beam direction cases, the drawing of the body contour is greatly facilitated by the fact that the first step is to take a negative impression of the affected part of the body. The array of fields is then planned on a contour drawn from the cast, in the normal way, and the time for each field is increased by 3 per cent, to allow for the difference between absorption in the cast material and tissue absorption. It is not necessary to rely on bolus to fill the air gaps, as the space between the applicator surface and cast is filled with a genuinely tissue-equivalent wax, such as that designed by Jones and Raine (9) and known as Mix D. The actual mechanism of beam direction does not matter for the present

purposes, so long as it is one which definitely inhibits all six degrees of freedom of movement of the patient relative to the x-ray beam. It should perhaps be stressed, however, that mechanical beam direction, as used in conjunction with a full case-planning section, is not executed merely by making the central rays of all the beams pass through the centre of the tumour: the fields are planned, as for all other cases, to give the ideal distribution of dosage throughout the tumour and healthy tissue.

SCATTER BEYOND EXIT PORT

With the quality of radiation usually employed in deep therapy today, a tissue depth in the region of 15 cm., or its equivalent, is required to ensure that the dose distribution is in accordance with that to be anticipated from the isodose charts. Accordingly, the clinical physicist watches out for any cases where the depth of tissue is appreciably less than this and in such instances specifies a bolus pillow or other means of providing back-scatter.

Even when the body thickness is great enough to provide sufficient scatter to make the greater part of the isodose chart correct, the doses at and near the exit ports may be appreciably altered by lack of scatter from beyond the exit (Clarkson and Herbert, 10). Since this effect does not, in general, impair the tumour dose, though it does lessen the skin dose, it is not to be overcome by provision of bolus. It is important, however, to determine whether the particular couch and mattress on which the patient lies is providing either more or less scatter than further tissue would have done. After such an investigation has been made, the clinical physicist can make a routine amendment of known magnitude to skin doses at exit ports, and this will automatically be included in every final dose plot.

AMENDMENTS TO CASE PLANS

It sometimes happens, quite inevitably, that treatment which has been begun with one plan has to be modified because of some new circumstance arising. It is of

the utmost importance that cases be referred back to the planning section for such amendments.

SEPARATE SITES

It has always been found worth while to complete separate treatment planning procedures when separate sites are to be treated in one patient. In such cases, it is generally necessary to make some allowance for the radiation received at one site from the treatment at another, and *vice versa*. Again, in the case of combination radium and x-ray treatment, as for carcinoma of the cervix with another tumour far down the vaginal wall, to be treated later by radium implantation, a considerable inter-dosage effect is involved.

POST-TREATMENT PROCEDURE

As will be seen, the treatment planning sheet (page 853) includes a section for summary of the vital physical data after the treatment is finished. This enables the situation to be set out clearly, allowing for any amendments, inter-dosage effects, etc. It also gives the clinical physicist the satisfaction of contact with the cases beyond the purely theoretical original planning.

FUTURE DEVELOPMENTS

It is becoming increasingly clear that the roentgen as a unit of dose may give way, in the not too distant future, to an absolute unit of energy absorbed in each particular tissue. As pointed out above, some such system as that described here will be indispensable when that does happen, for the amount of computational work required on every case would otherwise be quite outside the realms of practical policy.

Another special consideration previously mentioned is the phenomenon occurring in the haversian canals in bone. As Spiers (1) has shown, the true absorption in these canals, which contain the living elements of bone, is about double that computed from isodose charts based on a uniform phantom with one common quality of radiation. This and similar phenomena which will no doubt come to light in the future should

be given due consideration in every case plan, especially when the lesion involves bone.

Again, the trend towards high-energy beams, of the order of 10 mev, will bring with it new dosage problems, and it is important to have a case planning system that will deal with these. The haversian canal effect, for instance, appears to become negligible above 1 mev. However, during the early stages of the use of high-energy beams a thorough planning system will be more than ever desirable to investigate these points.

SUMMARY

The arrangement of a special case-planning section of a Radiotherapy Physics Department is described. The value of such a section in obtaining the optimum treatment for each individual case is emphasized. Such a section can provide full dose contours for the principal plane and other planes; it can make a crude allowance for bone, fat, and air; it can ensure the least harmful distribution of dosage in healthy tissue with minimum skin dosage; it can provide a figure for the integral dose in every case. The details of the working of the system are described. The value of such an organisation in allowing for various special facets of x-ray treatment is dis-

cussed. Its potential value, as a means of taking full advantage of future developments in x-ray case planning is indicated. In general, it is felt that such a section can, at a very small cost, provide additional services, which are out of all proportion to the outlay of money and time.

Department of Natural Philosophy
University of Aberdeen
Aberdeen, Scotland

REFERENCES

1. SPIERS, F. W.: Influence of Energy Absorption and Electron Range on Dosage in Irradiated Bone. *Brit. J. Radiol.* **22**: 521-533, September 1949.
2. SPIERS, F. W.: Effective Atomic Number and Energy Absorption in Tissues. *Brit. J. Radiol.* **19**: 52-63, February 1946.
3. MITCHELL, R. G.: Assessment of Dosage from Linear Radium Sources. *Brit. J. Radiol.* **19**: 339-342, August 1946.
4. MEREDITH, W. J., AND NEARY, G. J.: Production of Isodose Curves and the Calculation of Energy Absorption from Standard Depth Dose Data. *Brit. J. Radiol.* **17**: 75-130, March 1944.
5. MAYNEORD, W. V.: Energy Absorption. *Brit. J. Radiol.* **13**: 235-247, July 1940.
6. WALKER, J. Z.: New Technique of Treatment of Carcinoma of the Cervix Uteri by Combining X-ray and Radium. *Brit. J. Radiol.* **13**: 1-24, January 1940.
7. McWHIRTER, R.: Value of Simple Mastectomy and Radiotherapy in the Treatment of Cancer of the Breast. *Brit. J. Radiol.* **21**: 599-610, December 1948.
8. HOWARTH, J. L.: Some Simple Methods of Isodose Contour Projection for Symmetrical and Unsymmetrical Fields. *Brit. J. Radiol.* **23**: 358-367, June 1950.
9. JONES, D. E. A., AND RAINE, H. C.: Correspondence. *Brit. J. Radiol.* **22**: 549-550, September 1949.
10. CLARKSON, J. R., AND HERBERT, R. J.: Surface and Emergent Doses in Radiotherapy. *Brit. J. Radiol.* **21**: 494-500, October 1948.

SUMARIO

La Organización del Sistema Computador en la Determinación de la Dosis de Rayos X en el Centro de Radioterapia de Lincolnshire

En el Centro de Radioterapia de Lincolnshire, en el Hospital Memorial de Scunthorpe, Inglaterra, consideran la determinación de la dosis en la roentgenoterapia como función del Departamento de Física, encomendándose la ejecución de los cálculos necesarios a "computadores," o sea calculadoras adjuntas, jóvenes que han terminado sus cursos en la escuela secundaria y dotadas de aptitud para labor aritmética.

El radioterapeuta facilita un diagrama de los contornos del cuerpo y del tumor que

necesita, en una hoja de planeamiento terapéutico, en la que hace constar la dosis tumor requerida, la dosis tolerable al tejido sano y las instrucciones generales o especiales que se le ocurran. El físico toma a su cargo la selección experimental de los campos, posiciones, ángulos e intensidades, lo cual especifica, pasando luego la tarea a manos de las calculadoras, quienes abordan los cálculos con la ayuda de gráficas de isodoses.

El resultado pasa entonces de nuevo al físico para aprobación o rectificación.

Trázanse entonces los contornos de la dosis aprobada en la hoja de planeamiento, comprobándolos otra vez el físico, quien estipula los factores técnicos y remite el plan para el caso dado al Departamento de Terapéutica.

El sistema bosquejado permite facilitar

a costo mínimo el tratamiento óptimo a cada caso dado. El radioterapeuta queda desembarazado de pormenores que le roban el tiempo, sin perder por ello el contacto clínico, pues mantiene constantemente íntima coordinación con el físico y las computadoras.



Modification of Acute Irradiation Injury in Mice and Guinea-Pigs by Bone Marrow Injections¹

EGON LORENZ, Ph.D., CHARLES CONGDON, M.D., and DELTA UPHOFF, M.S.

THE PROBLEM OF finding an agent or a method that will protect against the effects of whole-body irradiation has always been an attractive one, but in recent years many more investigators have been bending their efforts in this direction. The agents or methods brought to light by these investigations may be divided into three groups. To the first group belong those which have to be given prior to the irradiation, one of the best known representatives of this group being cysteine (1). The second group consists of agents or procedures that are used during irradiation; the most effective method of this group is the protection of the exteriorized spleen of the mouse by lead, discovered by Jacobson *et al.* (2). The third group of protective measures are effective when given post-irradiation. Among these are the intraperitoneal transplantation of spleens after irradiation which, as Jacobson (3) has shown, significantly increases survival of irradiated mice, and the injection of bone marrow following doses which are lethal to untreated mice and guinea-pigs, which is the subject of this paper.

The discovery of the beneficial effects of spleen shielding against lethal doses of radiation raises the question whether a cellular or a humoral factor or both are involved in protection, since the shielded spleens of mice show abundant hematopoiesis following irradiation. Even the recent data of Jacobson *et al.* (3), dealing with the protective action of intraperitoneally transplanted spleens after lethal doses of irradiation, have not shown with certainty which factor or factors are involved, although the evidence appears to favor a humoral substance. The fact, however, that the shielded spleen of the mouse shows hematopoiesis makes it tempting to assume

that seeding of hematopoietic elements to various organs and tissues from the spleen may play a role in the recovery process. If this be the case, then seeding with the cellular constituents of bone marrow, as by intravenous injection, should also be effective in hastening recovery. Previous experiments, however, do not seem to bear out such reasoning. Rekers and his associates (4, 5) treated dogs with intravenous injections of dog bone marrow after irradiation to 350 r. Only an equivocal improvement in survival rate was obtained. Talbot and Gerstner (6), using stock Sprague-Dawley rats (genetically not homogeneous) obtained an insignificant prolongation of mean survival time in rats injected intravenously with rat bone marrow after irradiation to 800 r. The failure of these experiments to yield any significant increase in survival, in comparison to irradiated control animals, may have been due to several factors, the most important of which may have been injection of non-viable cells and the use of genetically heterologous bone marrow. The crucial experiment should consist, therefore, in the intravenous injection of homologous bone marrow after a lethal acute dose of radiation, the cell constituents of the bone marrow being kept viable as far as possible. In a preliminary experiment (7), data were presented showing that intravenous or intraperitoneal injections of homologous bone marrow into genetically homogeneous hybrid mice (LAF₁) or inbred guinea-pigs (family 2) protected these animals to a considerable degree against a lethal acute dose of radiation. The observations to be recorded here extend the previous data to include several other strains of mice and to protective effects of heterologous bone marrow.

¹ From The National Cancer Institute, National Institutes of Health, U. S. Public Health Service, Bethesda, Md., and Argonne National Laboratory, Division of Biological and Medical Research, Chicago, Ill. Presented at the Thirty-seventh Annual Meeting of the Radiological Society of North America, Chicago, Ill., Dec. 2-7, 1951.

TABLE I: EFFECTS OF HOMOLOGOUS BONE MARROW INJECTIONS FOLLOWING IRRADIATION ON SURVIVAL

Exp.	Dose (r)	Treatment	Strain	Number Animals	Number Dying on Indicated Number of Days																	Mortality (Per Cent)
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16-21		
1	900	None	LAF ₁	28	..	..	..	..	..	2	4	4	9	4	3	..	..	..	..	2	100
2	800	None	LAF ₁	10	..	..	..	..	..	2	1	1	3	3	..	..	..	..	..	..	100
3	900	I.V.	LAF ₁	20	..	..	..	..	..	1	1	1	1	..	..	..	..	..	..	..	20
4	900	I.P.	LAF ₁	16	..	..	..	1	..	1	..	2	..	..	..	..	..	..	..	..	25
5	900	None	C ₃ H ₆	60	..	..	..	2	4	9	20	8	8	3	6	..	..	..	..	..	100
6	900	I.V.	C ₃ H ₆	56	..	..	..	2	6	6	6	2	..	..	..	..	..	..	2	2	32
7	900	I.P.	C ₃ H ₆	63	..	..	7	5	9	8	5	7	7	..	2	2	2	3	..	..	90
8	900	I.V.	A	20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0
9	900	I.P.	A	19	..	..	..	..	..	..	..	2	7	4	2	..	..	1	..	..	84
10	900	I.V.	L	20	..	..	..	..	..	..	..	..	2	1	..	..	..	1	2	..	30
11	900	I.P.	L	20	..	..	..	..	2	2	2	2	..	..	..	..	..	..	..	..	40
12	550	None	Fam.2-G.P.	11	..	..	..	..	..	..	..	..	2	3	2	2	..	1	..	..	91*
13	550	I.V.	Fam.2-G.P.	5	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	40
14	550	I.P.	Fam.2-G.P.	6	..	..	..	..	..	..	..	..	1	1	1	..	..	..	..	..	50
15	550	I.C.	Fam.2-G.P.	4	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	25
16	550	I.C.	Fam.2-G.P.	10	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	10

* Eleventh animal died 26 days after irradiation.

TABLE II: EFFECTS OF HETEROLOGOUS BONE MARROW INJECTIONS FOLLOWING IRRADIATION ON SURVIVAL

Exp.	Dose (r)	Treatment	Strain	Donor	Number Mice	Number Dying on Indicated Number of Days																	Mortality (Per Cent)
						1	2	3	4	5	6	7	8	9	10	11	12	13	14-21				
1	900	I.P.	LAF ₁	Hybrid G.P.	20	..	2	5	..	..	..	..	..	1	9	1	1	1	..	100
2	900	I.P.*	LAF ₁	Hybrid G.P.	20	..	..	..	..	1	1	5	1	5	1	10	1	..	1	100
3	900	I.P.	LAF ₁	Fam. 2 G.P.	19	..	..	..	..	..	..	..	..	4	4	6	2	2	..	95
4	900	I.P.†	LAF ₁	Fam. 2 G.P.	10	..	..	..	..	1	..	..	..	1	4	2	1	1	..	100
5	900	I.V.	LAF ₁	Fam. 2 G.P.	10	..	..	..	..	..	..	..	1	1	4	..	..	..	..	60
6	900	I.V.	C ₃ H ₆	LAF ₁	18	..	..	..	..	4	1	..	2	3	..	1	..	..	..	56

* Injected three days after irradiation.

† Injected within half an hour and after three days following irradiation.

MATERIALS AND METHODS

Animals used in the experiments came from the colonies of the National Cancer Institute and consisted of genetically homogeneous hybrid LAF₁ mice (derived from mating a strain L mother with a strain A father), mice of strains, A, L, and C₃H_b, and genetically homogeneous guinea-pigs (family 2). Data on irradiation injury were available on these animals from former experiments (8). The 30-day LD 50 for LAF₁ mice is approximately 650 r; for strain A, 560 r; and for strain C₃H_b, 600 r. The 30-day LD 50 for strain L has not yet been determined but is probably somewhat smaller than that for LAF₁ mice. The 30-day LD 50 for guinea-pigs of family 2 is approximately 400 r.

The animals were irradiated at approximately three months of age. The mice were given a single tissue dose of 900 r and the guinea-pigs a single tissue dose of 550 r total body irradiation. These doses are uniformly lethal within thirty days in the animals employed.

To obtain uniform tissue doses, especially in the guinea-pigs, two x-ray tubes in juxtaposition were used. The tubes were operated at 186 kv.p. and 20 ma.; filtration was 0.25 mm. copper plus 1.06 mm. aluminum for the exposure of mice and 0.5 mm. copper plus 0.55 mm. aluminum for the exposure of guinea-pigs. The centers of the animals to be irradiated were placed at a distance of 54 cm. from each focal spot. The mice were irradiated in shallow cylindrical plastic boxes 15 cm. in diameter. The number of mice irradiated at the same time varied from 2 to 10 for the different experiments; accordingly, the tissue dose rate varied from 86 r to 96 r per minute. Guinea-pigs were irradiated singly in boxes made of stiff paper and covered on top with cheesecloth. The tissue dose rate was 62 r per minute, as measured in the middle of a dead guinea-pig; it was the same as the air dose within the limits of error of the ionization chamber.

Approximately ten to fifteen minutes

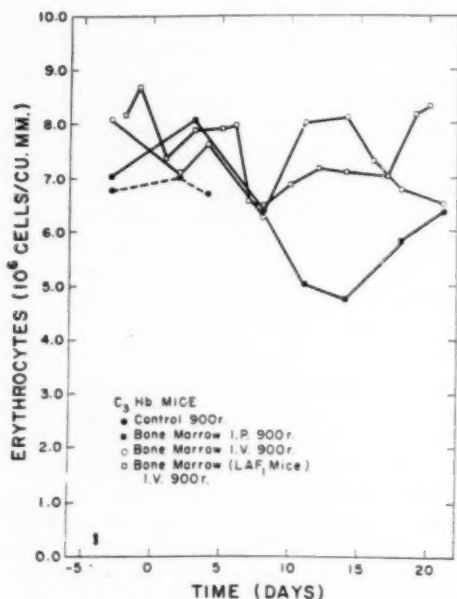
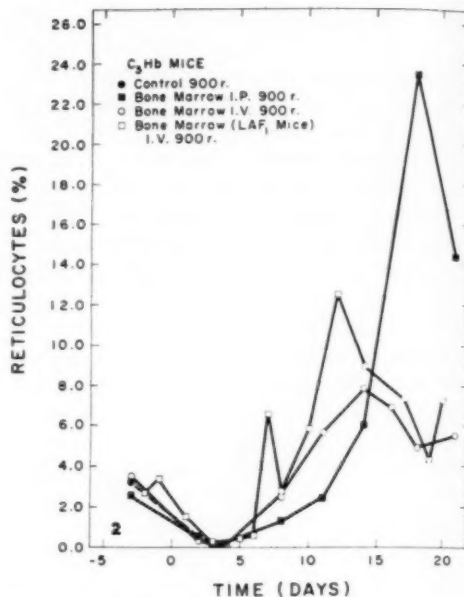
after irradiation the animals were injected with freshly prepared bone marrow suspensions. The marrow was obtained from the four long bones (femurs and humeri) of non-irradiated mice by aspiration into a needle fitting into the marrow cavity and was suspended in 0.5 c.c. of buffered saline. The amount of bone marrow obtained from a mouse by this method was approximately 1.5 mg. Guinea-pig bone marrow suspensions were also obtained from the four long bones. The bones were cracked longitudinally; a section of the broken bone was removed, and the marrow lifted out with a blunt forceps. Approximately 100 mg. of marrow were thus obtained from one guinea-pig. It was treated in a similar manner to the mouse bone marrow, being suspended in 0.5 c.c. of buffered saline (9). Injections were made in mice either intravenously into the tail vein or intraperitoneally; in guinea-pigs, intravenously into the external saphenous vein, intracardially or intraperitoneally.

RESULTS

(a) *Survival Data:* The effects of homologous bone marrow injections on survival of genetically homogeneous mice and guinea-pigs are shown in Table I. A survival period of twenty-one days was selected because by that time full recovery of the hematopoietic tissue had taken place. Only occasionally did animals die after the twenty-first day. The cause of their death was obscure, but it was not due to exhaustion of hematopoietic tissue. Usually, however, the experimental animals were not sacrificed until thirty to sixty days after exposure.

Among irradiated control animals, LAF₁ mice exposed to 900 r or 800 r, respectively, and C₃H_b mice exposed to 900 r, the mortality was 100 per cent during the 21-day period. No control animals of strains A and L were irradiated with 900 r. A 100 per cent mortality was expected from the findings on the hybrid LAF₁ mice, which are more vigorous than the parent strains.

The table shows that intravenous in-

Fig. 1. Erythrocyte count of C_3H_b mice following a total body exposure to 900 r.Fig. 2. Reticulocytes of C_3H_b mice following a total body exposure to 900 r.

jections of homologous bone marrow into irradiated LAF_1 , C_3H_b , A, and L mice (Experiments 3, 6, 8, 10) gave excellent protection, the mortality ranging from 0 to 32 per cent for the twenty-one-day period of the experiments. Intraperitoneal injection of homologous bone marrow following an exposure to 900 r gave also good protection in LAF_1 and strain L mice (Experiments 4, 11), but only slight protection in C_3H_b and strain A mice (Experiments 7 and 9).

The reason for the slight protection in strains C_3H_b and A has not been determined. However, the picture of the circulating blood of irradiated C_3H_b mice, shown in Figures 1, 2, and 3, gives an indication why intraperitoneal injection of bone marrow might be less effective in this strain than intravenous injection. Figure 1 shows the effect of the irradiation on the erythrocyte count in control and bone-marrow-injected C_3H_b mice. The control mice are dead before the effect of the irradiation on the erythrocytes is established. The mice injected intravenously with homologous bone marrow show a transient slight depression of the erythrocyte count on the

seventh day, while in the intraperitoneally injected mice recovery of the erythrocyte count does not begin until the fifteenth day. The appearance of reticulocytes in the circulating blood also lags behind in the intraperitoneally injected animals (Figure 2). The lag in recovery of these mice is most pronounced in the picture of the circulating leukocytes (Figure 3). Animals will still die during this delayed recovery of the hematopoietic system following intraperitoneal injection of bone marrow. In LAF_1 mice, in which survival is similar for intraperitoneal and intravenous bone marrow injections, the delay in recovery is much less pronounced.

In inbred guinea-pigs (family 2) good protection with intravenous, intraperitoneal, and intracardiac injection of homologous bone marrow following total body irradiation with 550 r was also obtained (Experiments 13 to 16), while the same dose killed 10 out of 11 controls within twenty-one days (the 11th animal dying on the twenty-fifth day) after irradiation (Experiment 12); mortality following injections of bone marrow decreased to 10 to

50 per cent depending on the route of administration. The striking effects of the bone marrow injections on the picture of the circulating blood of guinea-pigs are shown in Figures 4, 5, and 6. As in mice, a delay in recovery of the hematopoietic tissues is observed following intraperitoneal injection of bone marrow.

The experiments discussed so far deal with the protective effects of homologous bone marrow injections following a lethal dose of irradiation. In view of the failure of Rekers and his co-workers (4, 5) and Talbot and Gerstner (6) to obtain unequivocal protection with bone marrow from non-highly inbred animals, it seemed of interest to investigate whether or not conditions could be found under which heterologous bone marrow might also have a protective effect. Consequently, a series of experiments were performed in which mice were exposed to total body irradiation of 900 r and injected subsequently with heterologous bone marrow. These experiments are listed in Table II. In Experiments 1 and 2, LAF₁ mice were injected intraperitoneally with approximately 25 mg. of bone marrow of hybrid guinea-pigs: in Experiment 1, within ten to fifteen minutes after irradiation, and in Experiment 2, three days after irradiation. No protective effect was observed. In Experiment 1, 7 mice died on the second and third days after irradiation, while control irradiated animals of this strain did not begin dying until the sixth day. Histologic examination of 3 of these animals implicated bacterial infection as the cause of death. It was suspected that the hybrid guinea-pigs carried an infection of unknown origin, as some non-irradiated animals injected intraperitoneally with hybrid guinea-pig bone marrow also died a few days after injection. Repetition of these two experiments with intraperitoneal injections of inbred guinea-pig (family 2) bone marrow gave a more normal death distribution (Experiments 3 and 4) but no protection in spite of later onset of death in comparison to irradiated control animals.

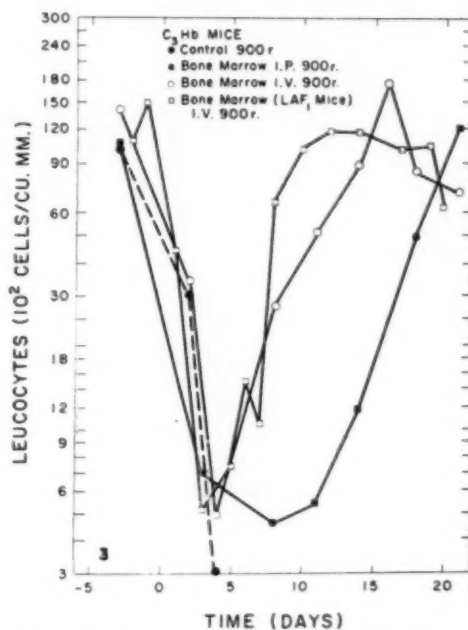


Fig. 3. Leucocyte count of C₃H_b mice following a total body exposure to 900 r.

At that time it was found that intravenous injection of bone marrow was, depending upon the strain of mice used, on the whole superior in its protective effect to intraperitoneal administration. Therefore, in Experiments 5 and 6, the heterologous bone marrow was injected intravenously. In Experiment 5, 25 mg. of guinea-pig bone marrow and in Experiment 6, 1.5 mg. of LAF₁ mouse bone marrow were injected into C₃H_b mice. The twenty-one-day survival in both experiments was approximately 40 per cent.

(b) *Histologic Data:* The typical picture of the hematopoietic tissues of mice following total body exposure to a lethal dose of irradiation was characterized by the following findings: In C₃H_b mice exposed to 900 r and killed serially from the day of irradiation until the fifth day thereafter, hematopoietic elements showed nearly total depletion by the second day, with a few megakaryocytes persisting to the fifth day. Depletion of lymphocytes reached its peak on the second and third days. Slight return of lymphocytic ele-

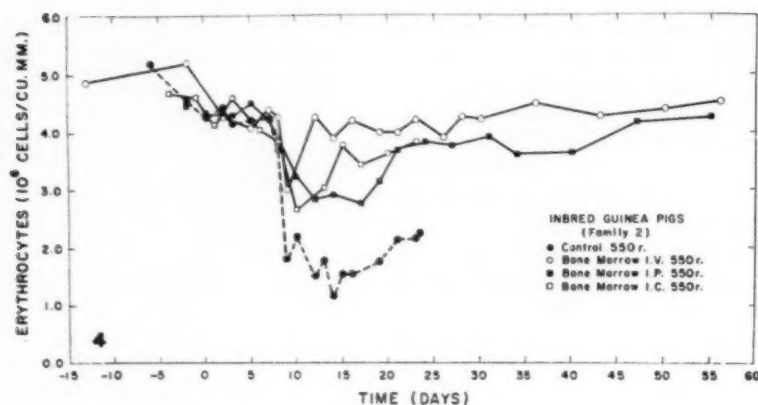


Fig. 4. Erythrocyte count of guinea-pigs (family 2) following a total body exposure to 550 r.

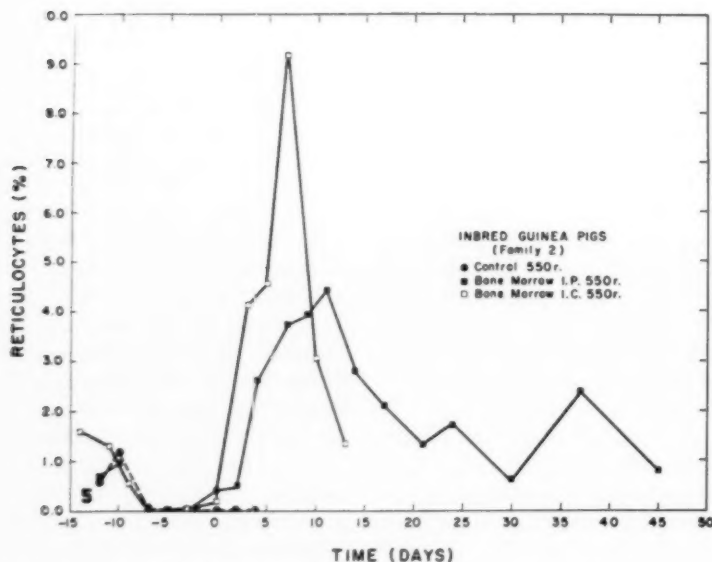


Fig. 5. Reticulocytes of guinea-pigs (family 2) following a total body exposure to 550 r.

ments was evident on the fourth day. Figure 7 shows a normal mouse spleen and Figure 8A the spleen of a mouse five days after exposure to 900 r. The same observations were made in animals of Experiment 5 (Table I) which died four to eleven days after irradiation. In addition, in these mice bacteremia was a frequent finding, and masses of bacteria were seen plugging capillaries in many organs.

On the other hand, in the more vigorous genetically homogeneous hybrids (LAF₁) exposed to 900 r (Experiment 1, Table I) slight to moderate regeneration of hematopoietic tissues was found in an occasional animal, although all died within the twenty-one-day period. Death was apparently due to bacterial infection.

When irradiated mice of the different strains received homologous bone marrow intraperitoneally or intravenously imme-

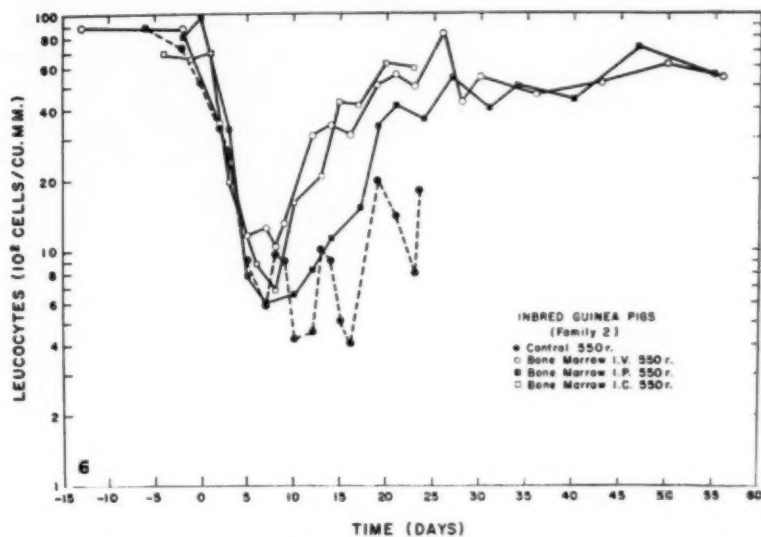


Fig. 6. Leucocyte count of guinea-pigs (family 2) following a total body exposure to 550 r.



Fig. 7. Spleen of normal C_5H_6 mouse showing hematopoietic cells in red pulp beneath capsule. The margin of a splenic nodule occupies the lower left quadrant of photomicrograph. Hematoxylin and eosin. $\times 210$

diately after the exposure, the surviving animals showed complete recovery of hematopoietic and lymphatic tissues. Bone marrow transplants consisting of hematopoietic cells between spicules of bone were found in some intraperitoneally injected mice. After intravenous injection, no transplanted cells could be detected. A lung lesion, to be described later, may have resulted from the presence of these cells. It was found particularly in animals surviving the twenty-one-day period. In mice which died in spite of the bone marrow injections, bacteremia was a prominent finding, as in irradiated control mice. Serial killings of irradiated C_3H_6 mice receiving intravenous bone marrow showed that return of hematopoietic cells in the red pulp of the spleen was taking place at three days, and the process was marked by the fifth day (Figure 8B). In the sternal marrow hematopoiesis began about the fifth day and was marked by the seventh day.

In guinea-pigs, as in mice, exposed to a lethal dose of total body irradiation, pronounced effects are produced on the hematopoietic and lymphatic tissues. Histologic evidence of bacteremia is lacking, however. Moderate regeneration of hematopoietic tissue was observed in one animal that survived twenty-six days. Figures 9 and 10A show the sternal bone marrow of a non-irradiated guinea-pig (family 2) contrasted with that of an animal given 550 r whole-body irradiation and found dead nine days later. When guinea-pigs of this family were given an injection of homologous bone marrow by the intravenous, intracardiac, or intraperitoneal route following a lethal dose of 550 r whole body irradiation, a return of hematopoietic and lymphoid tissues was found. Microscopic sections from serial killings made either the sixth or the ninth day after irradiation revealed that regeneration of sternal bone marrow was more advanced after intravenous and intracardiac injections than after intraperitoneal administration. Figures 10B and 10C illustrate this difference. The regeneration

of the sternal bone marrow in these animals paralleled the return of the peripheral blood toward normal (Figs. 4 and 6). Considerable new growth of bone marrow elements which developed in the omentum of the guinea-pig after intraperitoneal marrow injection is of uncertain significance. Results of two such transplants are shown in Figures 11 and 12. Somewhat similar but less well developed omental bone marrow nodules will develop from marrow transplantation in the same strain of inbred guinea-pigs without irradiation.

Pulmonary changes in irradiated and non-irradiated animals that received homologous bone marrow intravenously, intraperitoneally, or intracardially have been found sporadically in both mice and guinea-pigs. In general, the longer the period between bone marrow injection and the death of the animal, the more marked the lung lesion. The most constant changes were subpleural areas of partial atelectasis with cellular infiltrations around small vessels and bronchi. A suggestion of lymph follicle formation was occasionally observed in the lung parenchyma. Spicules of bone were found in relation to these areas in irradiated guinea-pigs and mice that were allowed to live several months after intravenous bone marrow injections. The significance of these findings is not yet clear. They seemed to be related, at least in part, to organization of bone marrow which reached the lungs rather than entirely to irradiation or inflammatory responses. Similar changes have been described with irradiation alone (10).

Ogata (11) studied experimentally the fate of bone marrow emulsions given intravenously, and Lubarsch (12) studied the fate of embolic bone marrow tissue in patients with eclampsia. Both found failure of hematopoietic cells to survive more than a few days. In addition, Lubarsch noted reabsorption or organization of bone marrow in pulmonary vessels.

Heterologous bone marrow was given after irradiation to two strains of mice

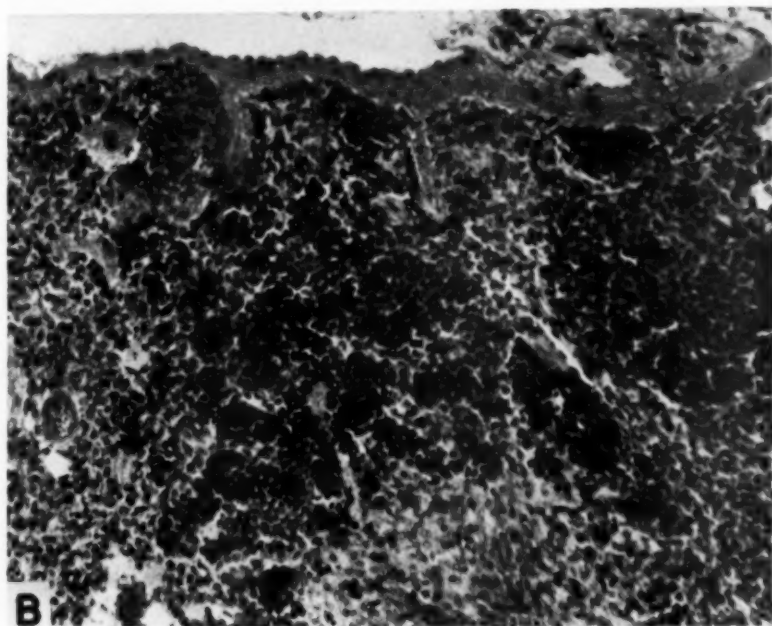
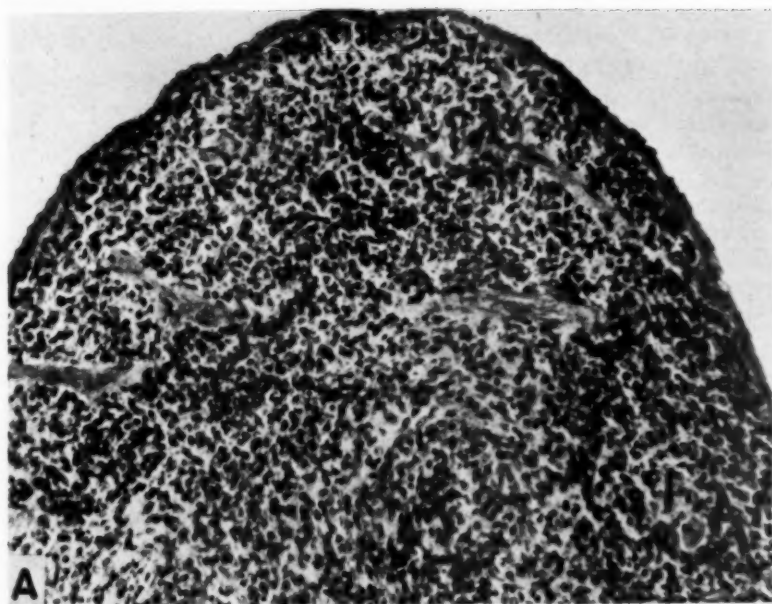


Fig. 8. A. Spleen of C_3H_6 mouse killed five days after 900 r whole-body irradiation. Both red and white pulp show depletion of hematopoietic and lymphatic tissues. Cells with dark-staining nuclei are lymphocytes and occasional plasma cells; with light-staining nuclei, reticulum cells.

B. Spleen of C_3H_6 mouse killed five days after irradiation plus intravenous injection of homologous bone marrow. Note large erythropoietic foci in central portion of photomicrograph, granulocytopenia beneath capsule in upper right, and young megakaryocyte near left margin. Regeneration of lymphatic tissue is minimal at this stage.

Hematoxylin and eosin. $\times 210$

as shown in Table II. Animals surviving for twenty-one days under these conditions, whether they received heterologous bone marrow from inbred guinea-pigs (family 2) or from another strain of mice, showed regeneration of hematopoietic and lymphatic tissues in the usual hemato-

DISCUSSION

The data presented give evidence of the effectiveness of injections of bone marrow after lethal doses of irradiation in reducing mortality. Intravenous homologous bone marrow injections are more effective than intraperitoneal injections, or intrato-

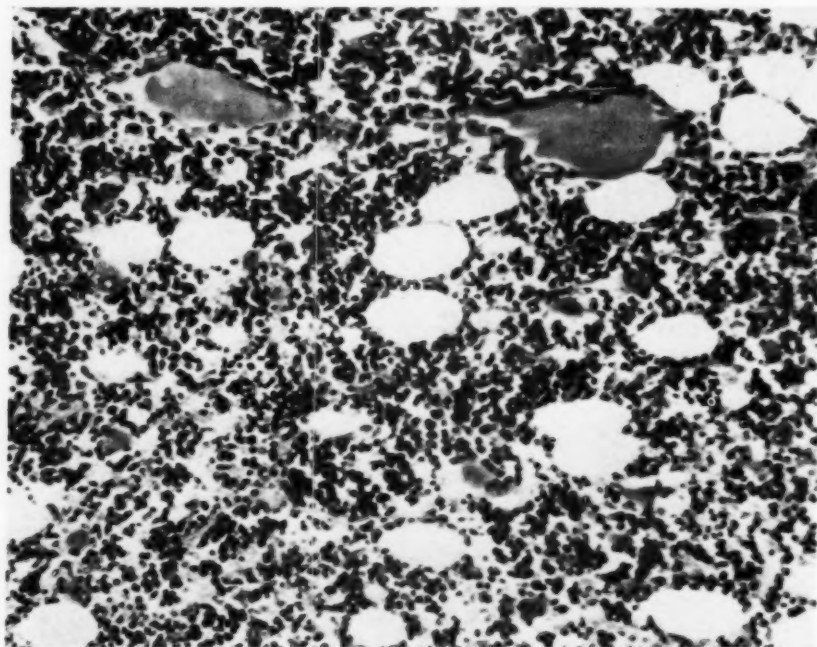


Fig. 9. Sternal bone marrow from a normal guinea-pig (family 2). Hematoxylin and eosin. $\times 210$

poietic organs. In mice receiving guinea-pig bone marrow intraperitoneally, as in Experiment 4 (Table II), the majority of the cells underwent necrosis and phagocytosis in the omentum but a few hematopoietic cells appeared to survive for as long as seven days, since living blood-forming cells were found in the area of necrosis and fibrosis of the heterologous transplant. Beginning formation of bone was also noted.

No lung lesion comparable to that seen with homologous bone marrow injections has been found in the few mice receiving heterologous bone marrow injections studied to the present time.

venous heterologous bone marrow injections. These findings are in contrast to those of previous investigators (4, 5, 6). How can their failures be accounted for in view of the protective action of bone marrow obtained by us?

It was stated in the introduction that injection of non-viable cells and of heterologous bone marrow after irradiation may have been the cause of failure. It was shown, however, that heterologous bone marrow from inbred guinea-pigs (family 2) injected intravenously into mice also gave protection, the amount of bone marrow per mouse being approximately 25 mg. in comparison to approximately 1.5 mg. of

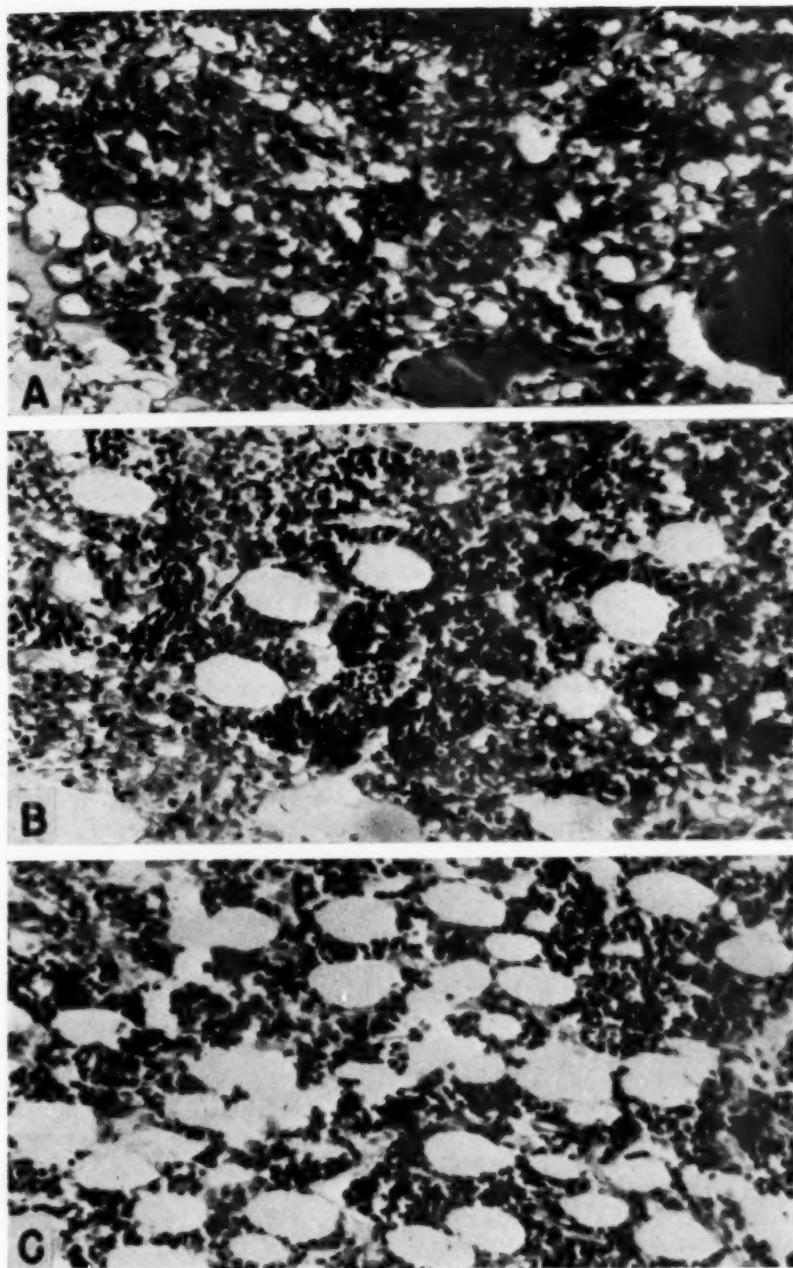


Fig. 10. A. Sternal bone marrow of guinea-pig (family 2) found dead nine days after irradiation. Note numerous erythrocytes and nearly total depletion of hematopoietic elements. Dark staining nuclei are primarily from reticulum cells, endothelial cells, and rare free hematopoietic cells.
 B. Sternal bone marrow of guinea-pig (family 2) killed nine days after irradiation plus intraperitoneal injection of homologous bone marrow. A focus of erythropoiesis is shown.
 C. Sternal bone marrow of guinea-pig (family 2) killed nine days after irradiation plus intravenous injection of homologous bone marrow. Note diffuse return of hematopoietic elements.
 Hematoxylin and eosin. $\times 210$

homologous bone marrow. No data are available on the amounts of bone marrow injected by Rekers or by Talbot, and it is conceivable that they were not sufficiently large to be effective. Furthermore, Rekers' dogs and Talbot's rats may not have been inbred in the true genetic sense. Nor are data available as to whether or not the bone marrow used by these workers was still viable when injected. Preparation of bone marrow smears made in a few of our experiments prior to injection showed that the cells were viable when injected. Finally, it must be pointed out that healthy donors (Experiments 1 and 2, Table II) may carry an infection which flares up in the recipient of the bone marrow. Thus, a number of possibilities exist which may explain failure of others to obtain protection by bone marrow injections.

So far it has been impossible to ascertain in what organs and tissues intravenously or intracardially injected bone marrow is deposited. No centers of extramedullary hematopoiesis could be attributed with certainty to deposits of injected bone marrow. The possibility exists, of course, that the injected bone marrow is mainly deposited in the spleen and bone marrow of the recipient. It is known that particles of the order of magnitude of 1 micron will be deposited mainly in these tissues (13). It is true that a comparison of the distribution of particles and cells in the body may be farfetched; however, assuming that cells behave like small particles and go to bone marrow and spleen, it would be nearly impossible to detect them after irradiation and impossible to state that the hematopoietic recovery observed in spleen and bone marrow is caused by proliferation of the injected cells. The observations on intraperitoneally injected bone marrow, which grows luxuriantly in the omentum of the irradiated animals, do not seem to be of importance from the point of view of recovery of the host. Although gross hematopoietic cellularity of these transplants paralleled that of the regenerating sternal bone marrow, recovery of bone marrow and, concomitantly, of the picture

of the circulating blood was delayed in comparison to intravenously injected bone marrow. No areas of extramedullary hematopoiesis of any importance were found following intraperitoneal injection of homologous bone marrow. If we want to assume that seeding with hematopoietic cells causes the recovery following intraperitoneal injection, we have to assume in this case, also, that the seeded cells went to bone marrow and spleen.

The only organs in which a lesion was observed following intravenous or intraperitoneal injections of bone marrow were the lungs. These pulmonary lesions consisted primarily of perivascular and peribronchial collections of mononuclear cells. Their extent varied considerably from animal to animal and they were found in both irradiated and non-irradiated animals. Although a final interpretation of this lesion has not been completed, it is believed that it is probably unrelated to the recovery.²

The difficulties encountered in the attempt to localize the intravenously injected cells to establish their role in the process of recovery becomes of less importance if we assume a humoral (non-cellular) factor produced by healthy bone marrow cells as responsible for the recovery. The location of the cells after injection becomes unimportant if their action is through the production of this humoral factor. It is assumed, but not yet proved, that intravenously injected cells stay alive and multiply in a manner similar to the intraperitoneal transplants, at least until recovery is established. The finding that heterologous bone marrow from another mouse strain or from a different species also protects makes the assumption of a humoral factor much more important. It could be shown that intraperitoneal heterologous transplants stay alive for at least seven days. On the assumption

² Additional studies completed since submitting this manuscript for publication demonstrate the presence of this pulmonary lesion in apparently normal guinea-pigs. It appears to represent focal areas of organized unresolved pneumonia and seems to have no special significance in the modification of irradiation injury by bone marrow injections.

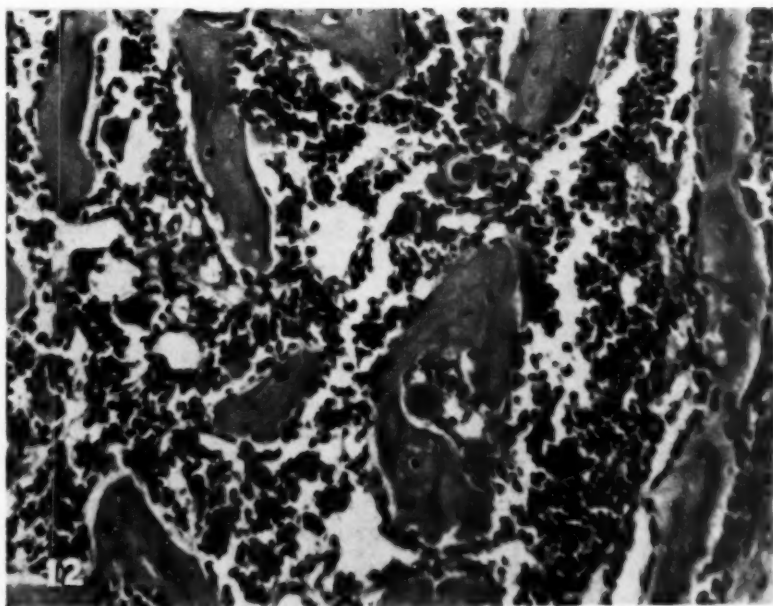
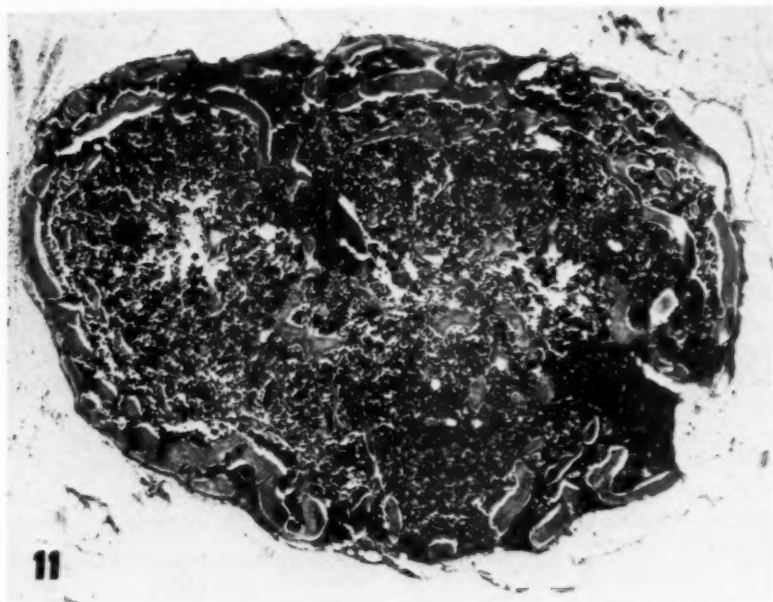


Fig. 11. Nodule of bone and bone marrow developing in omentum of a guinea-pig (family 2) killed fifty-nine days after irradiation plus intraperitoneal injection of homologous bone marrow. Note the cortical and cancellous arrangement of the bone spicules. Hematoxylin and eosin. $\times 30$

Fig. 12. Edge of organized bone marrow transplant developing in omentum of guinea-pig (family 2) killed twenty days after irradiation plus intraperitoneal injection of homologous bone marrow. Marrow spaces show all phases of hematopoiesis. Hematoxylin and eosin. $\times 210$

that intravenous transplants will stay alive the same length of time, a sufficient amount of the humoral factor may have been produced to start recovery of the bone marrow, especially as the amounts of heterologous bone marrow injected are considerably larger than those of homologous bone marrow.

SUMMARY AND CONCLUSIONS

It has been shown that bone marrow injections following lethal doses of irradiation are highly effective in reducing mortality in mice and guinea-pigs.

Mice of inbred strains A, L, C₃H₆, and genetically homogeneous hybrids, LAF₁, have a 30-day LD 50 ranging from 560 r to 650 r. A dose of 900 r will usually be lethal to such mice within twenty-one days. Inbred guinea-pigs (family 2) have a 30-day LD 50 of approximately 400 r. Rarely will these animals survive a few days beyond twenty-one days after irradiation with a dose of 550 r.

Injections of homologous bone marrow within a short time after irradiation with these otherwise lethal doses will decrease mortality significantly. In mice the mortality ranges from 0 to 30 per cent following intravenous injection of homologous bone marrow. Intraperitoneal injections of homologous bone marrow are in some strains much less effective, with a mortality range from 25 to 90 per cent. In guinea-pigs injections of homologous bone marrow are highly effective in prevention of mortality from irradiation injury. Whether the route of injection is intravenous, intracardial, or intraperitoneal, mortality ranges from 10 to 50 per cent.

Heterologous bone marrow from either another mouse strain or the guinea-pig will also reduce irradiation mortality in mice if the marrow is given intravenously; mortality is reduced to approximately 60 per cent by this treatment.

Histologically, it has not been possible at the present time to trace the intravenously injected bone marrow. This failure may be due to deposition of the marrow in hematopoietic spaces. It is

not caused by death and absorption, since intraperitoneal bone marrow has been found to grow luxuriantly in the omentum of irradiated animals.

A lung lesion was found following intravenous or intraperitoneal injection, consisting of perivascular and peribronchial collections of mononuclear cells. Interpretation of this lesion is still obscure. It may be of little significance for recovery after irradiation.

The protection obtained with heterologous bone marrow suggests a humoral (non-cellular) factor. However, the superior protection obtained with homologous bone marrow may indicate, in addition, a cellular factor. No information is available yet as to the way in which such factors hasten recovery.

Laboratory of Biophysics
National Cancer Institute
Bethesda 14, Md.

REFERENCES

1. PATT, H. M., TYREE, E. B., STRAUBE, R. L., AND SMITH, D. E.: Cysteine Protection against X Irradiation. *Science* 110: 213-214, Aug. 26, 1949.
2. JACOBSON, L. O., MARKS, E. K., GASTON, E. O., ROBSON, M. J., AND ZIRKLE, R. E.: Role of the Spleen in Radiation Injury. *Proc. Soc. Exper. Biol. & Med.* 70: 740-742, April 1949.
3. JACOBSON, L. O., SIMMONS, E. L., MARKS, E. K., GASTON, E. O., ROBSON, M. J., AND ELDRIDGE, J. H.: Further Studies on Recovery from Radiation Injury. *J. Lab. & Clin. Med.* 37: 683-697, May 1951.
4. REKERS, P. E.: Transplantation of Bone Marrow into Dogs That Have Received Total Body Single Dose Radiation. University of Rochester Atomic Energy Project, U. R. 11, 1948.
5. REKERS, P. E., COULTER, M. P., AND WARREN, S. L.: Effect of Transplantation of Bone Marrow into Irradiated Animals. *Arch. Surg.* 60: 635-667, April 1950.
6. TALBOT, J. M., AND GERSTNER, H. B.: Bone Marrow Implants in the Treatment of Radiation Sickness. USAF School of Aviation Medicine, Project 21-47-001, 1951.
7. LORENZ, E., UPHOFF, D., REID, T. R., AND SHELTON, E.: Modification of Irradiation Injury in Mice and Guinea Pigs by Bone Marrow Injections. *J. Nat. Cancer Inst.* 12: 197-201, August 1951.
8. LORENZ, E., JACOBSON, L. O., HESTON, W. E., ESCHENBRENNER, A. B., SHIMKIN, M., DERINGER, M., DONIGER, J., AND SCHWEISTHAL, R.: Biologic Effect of Long Continued Total Body Gamma Irradiation on Mice, Guinea Pigs and Rabbits. Part III. NNES, Div. IV, Vol. 22B. In press.
9. EARLE, W. R.: Production of Malignancy in Vitro; Mouse Fibroblast Cultures and Changes Seen in Living Cells. *J. Nat. Cancer Inst.* 4: 165-212 (p. 167), October 1943.
10. WARREN, S.: Effects of Radiation on Normal Tissues. V. Effects on the Respiratory System. *Arch. Path.* 34: 917-931, November 1942.

11. OGATA, S.: Megakaryocytenembolie und Knochenmarksembolie in Lungenkapillaren. Beitr. z. path. Anat. u. z. allg. Path. 53: 120-128, August 1912.

12. LUBARSCH, O.: Cited by Ceelen, W.: Atmungsweg und Lungen. In Henke, F., and Lubarsch, O.: Handbuch der speziellen pathologischen Anatomie und Histologie. 3/3:105. Berlin, J. Springer, 1931.

13. DOBSON, E. L., GOFMAN, J. W., JONES, H., KELLY, L., AND WALKER, L.: Studies with Colloids Containing Radioisotopes of Yttrium, Zirconium, Columbium, and Lanthanum. II. Controlled Selective Localization of Radioisotopes of Yttrium, Zirconium, and Columbium in the Bone Marrow, Liver, and Spleen. J. Lab. & Clin. Med. 43: 305-312, March 1949.

SUMARIO

Modificación de la Lesión Irradiatoria Aguda en Ratones y Cobayos por medio de Inyecciones de Médula Ósea

Los ratones de las cepas puras A, L, C₃Hb y los híbridos genéticamente homogéneos, LAF₁, representan una DL50 en 30 días que varía de 560 a 650 r. Una dosis de 900 r suele ser letal para dichos ratones en término de veintiún días. Los cobayos entrecruzados en la misma cepa (familia 2) representan una DL50 en 30 días de unos 400 r, sobreviviendo rara vez más de veintiún días después de ser irradiados con una dosis de 550 r.

Las inyecciones de médula ósea homóloga al poco tiempo de la irradiación con esas dosis habitualmente letales harán bajar en forma significativa la mortalidad. En los ratones, la mortalidad oscila entre 0 y 30 por ciento después de la inyección endovenosa de médula ósea homóloga. Las inyecciones intraperitoneales de dicha médula son, en algunas cepas, mucho menos eficaces, dando una mortalidad de 25 a 90 por ciento. En los cobayos, las inyecciones de médula ósea homóloga son sumamente eficaces para impedir la mortalidad debida a lesión irradiatoria. Ya sea la vía de inyección endovenosa, intra-

cardíaca, o intraperitoneal, la mortalidad varía de 10 a 50 por ciento.

La médula ósea heteróloga, procedente ya de otra cepa murina o del cobayo, también rebajará la mortalidad irradiatoria en los ratones si se administra endovenosamente.

Histológicamente, no ha sido posible hasta ahora trazar el paradero de la médula ósea inyectada endovenosamente. El perderla de vista no se debe a la muerte y a la absorción, dado que la médula ósea inyectada por vía peritoneal crece en forma exuberante en el epiplón de los animales irradiados.

Después de la inyección endovenosa o intraperitoneal, se observó una lesión pulmonar que consistía en conglomeraciones perivasculares y peribronquiales de mononucleares. La interpretación de esa lesión es todavía dudosa.

La protección obtenida con la médula ósea heteróloga sugiere un factor humoral (no celular). Sin embargo, la protección superior lograda con la médula homóloga puede indicar la intervención, además, de un factor celular.

DISCUSSION

Richard H. Chamberlain, M.D. (Philadelphia, Penna.): There is much that is the latest word in basic radiological research in Dr. Lorenz's contribution. Few things are as stimulating to those interested in radiobiology as the demonstration of a protective agent which seems to act *after* irradiation, in contradistinction to a great many agents which have to be applied before or during irradiation. Of interest also is the apparent non-cellular nature of the protective action of the injected bone marrow.

Dr. Lorenz's evidence is corroborated in a small way by an experiment in which we gave injections of homologous bone marrow to Wistar rats, which

are not inbred. Following 1,000 r, the small group of rats that received marrow showed a mortality of only 20 per cent, as compared to 70 per cent in those not injected.

I believe, if I may venture a prophecy, that this is one of the most important phenomena demonstrated in the recent past and that it may be of basic significance in our study of the mechanism of action of radiation on living tissue. Obviously, this is not a cure for atom bomb victims or anything of the sort, but it has great implications in basic radiobiology and may be an important stepping stone in our search for such agents.

Radiopaque Renal Calculus Identified as Cystine by X-ray Diffraction¹

JONATHAN PARSONS, M.A.

Detroit, Mich.

CYSTINE CALCULI are commonly considered to be radiolucent. Kerr and Gillies (1) stated that pure cystine stones are not opaque to roentgen rays, and Michels and Engel (2) made a similar observation. According to these latter authors, only if there is an admixture of inorganic substances are the stones demonstrable roentgenographically. Pure cystine calculi, they say, can be cut like hard yellow soap. The calculus to be described in the present communication, though of pure cystine, was not radiolucent, nor could it be cut in the manner described by Michels and Engel.

The frequent occurrence of small soft cystine stones is probably responsible for the impression that all cystine calculi are radiolucent. Wesson (3) found a considerable difference of opinion regarding the shadows cast by such calculi and states that frequently they may be recognized by the roentgenographic appearance. Actually it is believed that all but about 8 per cent of cystine stones may be visualized on the roentgenogram.

Cystine is a constituent of 2 to 4 per cent of all renal calculi (2, 4). Kerr and Gillies state that cystine stones occur only in persons who do not metabolize cystine but excrete it in the urine. In their paper, "The Composition of Urinary Calculi," Prien and Frondel (5) refer to cystine calculi as being very soft unless they are densely granular. They describe examples of soft consistency with a pearly luster, and from 2 to 3 mm. in diameter.

During a study of urinary calculi by x-ray diffraction in the Edsel B. Ford Institute for Medical Research, a large renal stone, measuring 27 × 19 × 13 mm. (Fig. 1), was analyzed, giving a diffraction

pattern (Fig. 2) corresponding to that of chemically pure cystine. The calculus was radiopaque (Fig. 3), honey-yellow in color, very hard, and of dense texture, with a waxy appearance. It was similar in many respects to stones composed of uric acid, but the diffraction pattern was distinctly different.

This stone had been removed from a 24-year-old white woman who had been in the Urology Clinic of the Henry Ford Hospital complaining of right flank pain. Examination had shown tenderness in the right costovertebral angle and the urine contained numerous pus and red blood cells. The patient stated that during the previous two years stones had been removed from the right kidney on three different occasions and once from the left kidney. Pyelographic examination revealed several calculi in the right renal pelvis and one in the left. The stone described here had been removed at one of the previous operations and was brought to the hospital by the patient.

On a comparison of the diffraction pattern obtained from this large calculus with that obtained from chemically pure cystine, it is obvious that the two are identical both as to number and relative intensities of lines. Since as little as 5 to 10 per cent of some other crystalline compound is generally detectable by x-ray diffraction methods, the composition of this stone can be estimated as from 90 to 100 per cent cystine. Such a stone may be considered as a pure cystine calculus.

A chemical analysis of the calculus made by the Department of Biochemistry, in order to corroborate the analysis by x-ray diffraction, was reported as follows: After heating for two hours at 105° C. there was

¹ From the Edsel B. Ford Institute for Medical Research, The Henry Ford Hospital, Detroit, Mich. Accepted for publication in October 1951.

no appreciable loss of weight. The calculus dissolved easily in normal HCl with only a trace of mucus. On dilution to 0.1 normal concentration and neutralization with sodium acetate, there was no precipitation, indicating absence of oxalate.

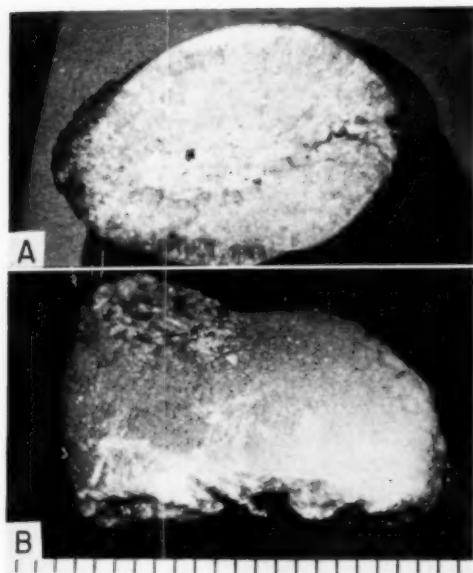


Fig. 1. Fractured cystine calculus. A. Cross-sectional view. B. Side view.

On neutralization with ammonia there was no precipitation; therefore, no large amount of phosphate was present. The original powder did not effervesce when treated with normal acid, indicating no significant amount of carbonate.

Quantitative analysis:

Cystine.....	94.2%	(Method of Sullivan, Howard, and Hess, 7)
Calcium.....	0.91%	(Method of Clark and Collip)
Inorganic phosphate (calculated as P)....	0.426%	(Method of Fiske and Subbarow)

The amounts of calcium and phosphate permit the presence of about 2.1 per cent $\text{Ca}_3(\text{PO}_4)_2$.*

* $\text{Ca}_3(\text{PO}_4)_2$ reported found in calculi commonly has the crystalline form of apatite.

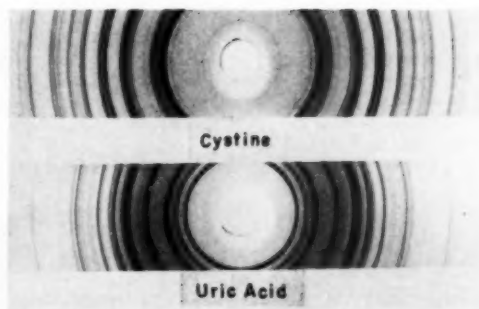


Fig. 2. X-ray diffraction powder photographs of cystine and uric acid calculi.

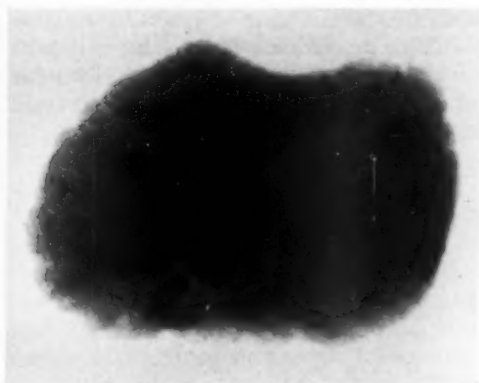


Fig. 3. Roentgenogram of large cystine calculus.

CONCLUSION

A large renal calculus identified by x-ray diffraction and chemical analysis as pure cystine has been described. That it is possible for a stone of densely packed cystine to be quite opaque to x-rays has been shown.

NOTE: Acknowledgment is made to Dr. R. C. Slocum, Department of Urology, the Henry Ford Hospital for his co-operation, and to Dr. O. H. Gaebler, Department of Biochemistry, Edsel B. Ford Institute for Medical Research, for making the chemical analysis.

Edsel B. Ford Institute
The Henry Ford Hospital
Detroit 2, Mich.

REFERENCES

1. KERR, H. D., AND GILLIES, C. L.: The Urinary Tract: A Handbook of Roentgen Diagnosis. Chicago, Year Book Publishers, 1944.
2. MICHELS, A. G., AND ENGEL, W. J.: Cystinuria and Cystine Calculi. Cleveland Clinic Quart. 17: 80-88, April 1950.

3. WESSON, M. B.: Urologic Roentgenology. Philadelphia, Penna., Lea and Febiger, 1946. (See page 140.)
4. PRIEN, E. L.: Studies in Urolithiasis: II. Relationships between Pathogenesis, Structure and Composition of Calculi. *J. Urol.* **61**: 821-836, May 1949. (See page 822.)
5. PRIEN, E. L., AND FRONDEL, C.: Studies in Urolithiasis; Composition of Urinary Calculi. *J. Urol.* **57**: 949-994, June 1947.
6. LOWSLEY, O. S., AND KIRWIN, T. J.: Clinical Urology. Vol. II. Baltimore, Md., Williams and Wilkins Co., 1944. (See page 1594.)
7. SULLIVAN, M. X., HOWARD, H. W., AND HESS, W. C.: Estimation of Cystine in Finger Nail Clippings with Hydrolysis for One Hour. *J. Biol. Chem.* **119**: 721-724, July 1937.

SUMARIO

Cálculo Renal Radioopaco Identificado como Cistina por la Difracción con los Rayos X

Los cálculos de cistina pura han sido considerados en general como radiolucientes, y por lo tanto, como inobservables con los rayos X. Esta opinión parece estar fundada en la frecuencia de los calculillos de cistina blanda. En realidad, parece hoy día que pueden observarse radiológicamente a los menos 90 por ciento de los cálculos de cistina.

En el caso ahora comunicado, un nefrolito duro y grande extraído quirúrgicamente resultó ser radioopaco. Aunque parecido en muchos sentidos a un cálculo de ácido úrico, el patrón mostrado a la difracción con los rayos X reveló que constaba de cistina casi pura (95 por ciento aproximadamente), observación esta apoyada por el análisis químico.



EDITORIAL

Radiation Dosage Planning and Dosage Calculation

In radiation therapy it is generally appreciated that tumor effect is dependent on tumor dose, and on the total time during which this dose is administered. For a particular patient and series of treatments, determination of tumor dose requires the following procedures:

1. Construction of a life-sized cross-sectional diagram of the individual at the proper level.
2. Indication on this of the exact position, size, and shape of the tumor, in so far as possible, and of the portals of entry of each field.
3. Application of isodose charts for each field to obtain the dosage contribution in various parts of the tumor—*not the central point alone*—and for any other points of concern, such as skin portals or vital organs.
4. Addition of contributions from all beams to obtain total doses, for all points in question.

Frequently before a series of treatments is undertaken, several different dosage schemes need to be studied, to see how the desired tumor dose can best be administered.

It is evident that the use of depth-dose tables alone, which supply only the doses along the axes of the beams, can never give really satisfactory tumor dose data. If all the axes pass through the same point, summing up doses from depth dose tables will give the dose at this point, but will tell nothing about dosage at any other place.

Few radiologists feel that they have time to do satisfactory dosage planning and calculation on more than a small number of patients. Indeed, this should not be the

task of the radiologist alone, but of the radiation physicist in collaboration with the therapist. Departments of radiation physics in the United States are not as rare as they were a few years ago, but they are still the exception, even in hospitals with large x-ray departments. This is partly because of the lack of adequately trained physicists with interest in radiation therapy, and partly because of a reluctance of administrators to add personnel to their departments, or of their failure to realize the value of such personnel.

A considerable number of radiologists have circumvented the first difficulty by finding young men or women (college graduates, usually with a major in physics) who are interested in entering this field, taking them into their departments and gradually working out their own procedures. This in-training, supplemented by visits to established radiophysics departments, has produced some very good results. Little formal training in radiation physics is offered in the United States, but it is becoming increasingly possible to arrange for informal "apprenticeships." Three to six months spent in a busy radiophysics department should provide good basic training; a period less than three months can seldom be considered satisfactory. A person with this minimum training is, of course, not a radiation physicist, but he is well on the way. With the advice and guidance of the radiotherapist, he should be able to do dosage planning and calculating, as well as to work out various beam-direction techniques and perform other valuable services in the x-ray department. As he gains in knowledge and ability, he will become more and more valuable, and the physics section will inevitably grow.

As for the second difficulty, the creation

of the position of radiation physicist, or the demonstration of his need and value to those who control budgets, this is a matter of education. If the radiologist himself is really convinced, he should have no trouble convincing others.

In this issue of RADIOLOGY appears an article by Duncan Lindsay describing in detail how the work of dosage planning and calculation is carried out in a large British radiotherapy center. It is evident that in their procedures far greater use is made of technical personnel than in America, where the radiologist maintains closer contact with the patients. In this country, even in departments with physicists and dosage planning programs, the actual treatments are supervised by the radiologist or his residents or fellows, rather than by technicians. While the British "therapy radiographer" has in general more training than the American therapy technician, she is still not a doctor. The several stages of the patient's progress from radiologist to physicist to planning center to mold room to radiographer (with the radiotherapist apparently responsible only for marking the fields on the patient) appear to deprive the radiologist of the close association with the patient which he should maintain at all times. There is also the possibility that errors may be passed along, instead of being caught when checking and re-checking are carried out by the radiologist and physicist together. However, the aims discussed are those which should be held by all therapists, and the method contains much of value which can be adapted to other types of personnel groups. The cross-sectional anatomical charts are readily available; the isodose charts present a greater problem.

Some are available from the Association of British Physicists.¹ Methods have been published for their calculation; that of Meredith and Neary, referred to in Lindsay's paper, is probably the most practical, but their basic tables are calculated from data which have been shown to need revision. It is hoped that, with their collaboration, RADIOLOGY will in the near future be able to present detailed instructions for isodose calculation, together with revised basic tables.

Various pieces of equipment, such as contour projectors, are of great assistance in dosage planning. These are frequently described in the radiological literature, especially in the British journals. They are not at present manufactured in this country, but if there is sufficient demand, a supply will certainly be forthcoming.

The first need is the general realization that the physicist and his set-up in the x-ray department can, as Mr. Lindsay says, "provide additional services which are out of all proportion to the outlay of money and time." The second is general pressure for the production of such physicists. In the urge for development of bigger and better equipment, the parallel development of personnel has been insufficiently stressed. Means must be found to make the field attractive to competent individuals, and to prepare them to work in it. Only when each radiotherapy department has its own dosage-planning center can patients therein be treated in the best possible manner with the equipment at hand.

EDITH H. QUIMBY, Sc.D.

¹ Mr. D. E. A. Jones, Honorary Secretary, Hospital Physicists Association Diagrams and Data Sub-Committee, Mt. Vernon Hospital, Northwood, Middlesex, England.



Dental Manifestations of Systemic Disease

In the current issue of *RADIOLOGY* there appears the last of a series of three articles on the Dental Manifestations of Systemic Disease. In a painstaking study, the author has collected and classified the lesions of the jaws and teeth which indicate to the trained observer the presence of developmental disturbances or generalized disease processes, demonstrating the great importance of dental roentgenography not only to the dentist but also to the clinician and the roentgenologist.

The pathological changes which are depicted on the roentgenogram may involve the bony supporting structure, the teeth, and the tooth sockets. Changes in the bony structure of the jaws are often similar or identical to disease changes in the general skeleton, and minimal distortion of the trabecular pattern as revealed on intra-oral roentgenograms should lead to a complete study of the other skeletal areas.

In the first paper of the series the author calls attention to the fact that the development of the teeth generally conforms to chronologic skeletal development and can be used as an index in determining the approximate skeletal age. He then proceeds to show the dental manifestations of the various endocrine disturbances, citing cases and illustrating them with dental roentgenograms.

The second installment concerns developmental disturbances which are manifested orally by faulty dental structure, interference with normal eruption of the teeth, and malocclusion. Most of the conditions which affect dentition are those

which primarily involve the skeleton. Rarely the dental defects may be of ectodermal origin, such as ectodermal dysplasia, in the severest form of which there may be total dental aplasia. In advanced cases the dental changes may not be necessary for a diagnosis, but in mild cases they may provide the first clue to recognition of the condition.

In the third and current portion of this series, attention is called to the Hutchinson teeth of congenital syphilis, probably one of the earliest characteristic dental defects to be noted. The bone changes in the jaws which are present in some of the reticulo-endothelial diseases are of unusual interest. Paget's disease also produces characteristic changes in the jaws which may be one of the earlier evidences of this condition. Metabolic diseases are manifested both through developmental changes and changes in mineralization. Radiation necrosis of the jaw is, of course, a matter of particular concern to all radiologists.

In the April issue of *RADIOLOGY*, there appeared also an article by Robinson and Sarnat devoted to the bone changes in the jaws of 22 patients with sickle-cell anemia. Significant osteoporosis was found in 18 cases in this series.

These demonstrations of the relationship between the dental changes shown on the roentgenogram and generalized abnormalities and diseases are of unusual interest. They should stimulate medical radiologists to include careful studies of the teeth and jaws when searching for evidences of systemic disease.



ANNOUNCEMENTS AND BOOK REVIEWS

FLORIDA RADIOLOGICAL SOCIETY

At the annual spring meeting of the Florida Radiological Society, the following were elected to office for the year 1952-53: Dr. Thos. H. Lipscomb, of Jacksonville, President; Dr. Nelson T. Pearson, of Miami, Vice-President; Dr. A. Judson Graves, 2002 Park St., Jacksonville, Secretary-Treasurer.

NASSAU RADIOLOGICAL SOCIETY

The Nassau Radiological Society, including most of the qualified radiologists of Nassau and Suffolk Counties (Long Island, New York) was organized on January 29, and proceeded to elect the following officers: President Dr. Percival A. Robin, Hempstead; Vice-President, Dr. James C. Barnett, Hicksville; Secretary, Dr. Joseph J. La Vine, 259 N. Grand Ave., Baldwin; Treasurer, Dr. David L. Jellinger, Patchogue; Members of the Executive Committee, Dr. Herbert R. Zatzkin, Greenvale, and Dr. Benjamin L. Fuerstein, Bay Shore.

The Society will meet on the second Tuesday of the month in February, April, June, October, and December.

ROCKY MOUNTAIN RADIOLOGICAL SOCIETY

The Fourteenth Annual Mid-Summer Conference of the Rocky Mountain Radiological Society will be held in Denver, Colorado, at the Shirley-Savoy Hotel on Aug. 7, 8, and 9, 1952. The program, not yet completed, includes the following guest speakers:

W. C. BANKS, D. V. M., College Station, Texas

1. Clinical Cases Occurring in Veterinary Radiology
2. Some Diseases of Dogs That Also Occur in Man

PHILIP J. HODES, M.D., Philadelphia, Penna.

1. The Roentgen Manifestations of Pancreatic and Periapillary Disease
2. The Roentgen Manifestations of Cerebello-pontine Angle Tumors

HAROLD O. PETERSON, M.D., St. Paul, Minn.

1. The Roentgen Diagnosis of Benign Gastric Ulcer
2. Unusual Neurologic Conditions with Diagnostic Roentgen Findings

GEORGE H. RAMSEY, M.D., Rochester, N. Y.

1. Cinefluorographic Analysis of Some Movements of the Cervical Spine
2. Cinefluorographic Analysis of the Causes of Dysphagia

A. JUSTIN WILLIAMS, M.D., San Francisco, Calif.
Roentgen Diagnosis of Intra-Abdominal Hernia

A symposium on diseases of animals transmissible to man will be presented from the standpoint of

veterinary medicine as well as from the bacteriological, pathological, and clinical points of view.

Other participants in the program, with their subjects are:

RICHARD B. BRIDENBAUGH, M.D., Billings, Mont.
Gallstone Ileus

H. H. DUNHAM, M.D., Kansas City, Kans.
Lymphosarcoma; A Review of 100 Cases

WILLIAM M. KITCHEN, M.D., Kansas City, Mo.
Examination of the Bleeding Colon

MORRIS H. LEVINE, M.D., Denver, Colo.
Beta Irradiation of the Eye

GERALD S. MARESH, M.D., Denver, Colo.

Roentgen Therapy in Lymphoid Hyperplasia of the Nasopharynx

H. MARKS, M.D., New York, N. Y.

Palliative X-Ray Therapy with the Use of a Grid in Advanced Carcinoma

J. R. MAXFIELD, JR., M.D., Dallas, Texas

Radioactive Iodine, I^{131} , as an Indicator of Thyroid Function and for the Therapy of Certain Thyroid Diseases

J. MARSHALL NEELY, M.D., Lincoln, Nebr.

An Evaluation of Sella Turcica Changes, the Result of Intracranial Pathology

HENRY P. PLENK, M.D., Salt Lake City, Utah

Aneurysmal Dilatation of the Great Vessels: The Use of Angiocardiography and Cardiac Catheterization in the Differential Diagnosis

MARCUS J. SMITH, M.D., Santa Fe, N. Mex.

Roentgenographic Aspects of Complete and Incomplete Pulmonary Infarction

E. DALE TROUT, Ph.D., Milwaukee, Wisc.

The Use of Filters to Control Patient Dose in Diagnostic Radiography

C. EDGAR VIRDEN, M.D., Kansas City, Mo.

Testicular Neoplasms

ANGUS K. WILSON, M.D., Salt Lake City, Utah

Investigations of Silicosis in Utah

Round table discussions will be held in connection with luncheon meetings. Evening meetings will include a joint session with the Denver Medical Society, followed by a Dutch lunch, and an informal banquet with entertainment. The annual picnic on Saturday afternoon will conclude the conference.

ECUADOR SOCIETY OF RADIOLOGY AND PHYSIOTHERAPY

The Society of Radiology and Physiotherapy of Ecuador, with headquarters in Guayaquil, has recently elected the following officers for the ensuing year: President, Dr. Germán Abad V.; Vice-President, Dr. Eloy Guerrero B.; Secretary, Dra. Olga Seminario Vergara; Treasurer, Dr. Jorge Illingworth; Directors, Dr. Efrén Jurado L., Dr. Mario Hinojosa C., and Dr. Reinaldo Irigoyen A.; Librarian, Dr. Juan Zuñiga.

GROUP DISABILITY INSURANCE PLAN AMERICAN COLLEGE OF RADIOLOGY

Announcement has been made of a Group Plan of Disability Income Protection under sponsorship of the American College of Radiology. Currently available to members and fellows are three basic plans of insurance, ranging from \$50.00 to \$100.00 weekly benefits, with specific sums for accidental death and dismemberment losses.

Coverage is provided on a worldwide basis against the hazards of accident and illness. Accident indemnities are payable from the first day of disability, while sickness benefits are payable for a two-year period, commencing with the first day of hospitalization or the eighth day of disability, whichever occurs first. Policies are individually non-cancellable and the plan is underwritten by the Continental Casualty Company of Chicago.

Books Received

Books received are acknowledged under this heading, and such notice may be regarded as recognition of the courtesy of the sender. Reviews will be published in the interest of our readers and as space permits.

AN ATLAS OF GENERAL AFFECTIONS OF THE SKELETON. By SIR THOMAS FAIRBANK, D.S.O., O.B.E., M.S., Hon. M.Ch.(Orth.), F.R.C.S., Consulting Orthopaedic Surgeon and Emeritus Lecturer in Orthopaedic Surgery, King's College Hospital; Consulting Surgeon, Hospital for Sick Children, Great Ormond Street; Emeritus Consulting Surgeon, Lord Mayor Treloar Orthopaedic Hospital, Alton; Honorary Consultant (Orthopaedic) to the Army. A volume of 410 pages, with 510 illustrations. Published by Williams & Wilkins Co., Baltimore, 1951. Price \$10.00.

MEDIZINISCHE RÖNTGENTECHNIK. Lehrbuch für medizinisch-technische Assistentinnen, Studierende und Ärzte. Edited by DR. HERBERT SCHOEN, Chief of the Central Roentgen Institute, Municipal Hospitals, Karlsruhe. II. Teil. (1) Grundlagen der Strahlendiagnostik und Strahlen-

therapie, Apparatekunde. By DIPL. PHYSIKER ERICH BUNDE, Karlsruhe. (2) Röntgen- und Farben-photographie. By DR. VIKTOR LOECK, Wuppertal-Elberfeld. A volume of 360 pages, with 217 illustrations. Published by Georg Thieme, Stuttgart. Distributors for U. S. A. and Canada: Grune & Stratton, Inc., New York, N. Y. Price DM 27.

PNEUMOPERITÔNIO DIAGNÓSTICO. By FRANCISCO CAVALCANTI DA SILVA TELLES. A monograph of 198 pages, with 73 plates. São Paulo, 1951.

In Memoriam

JULIUS B. WANTZ

Julius B. Wantz, holder of more than fifty patents in the field of x-ray and electromedical apparatus, and a pioneer in adapting electricity to medicine, died on April 6, at his home in River Forest, Ill., at the age of 78. Mr. Wantz was a co-founder of General Electric's X-Ray Department. As early as 1893 he had started work in a basement workshop on Chicago's South Side, on the application of small motors to dental equipment. The experience acquired there enabled him to meet the demands for x-ray generators following upon Roentgen's discovery of the x-rays, and the new field thus opened led to the formation of the Victor X-ray Corporation, which was acquired by General Electric in 1920. Mr. Wantz continued to serve that company until his retirement in 1946, at which time he was Consulting Engineer.

In addition to the motor-driven dental engine with friction-type speed control and motorized static generators for x-ray units, Mr. Wantz developed bone surgery equipment, centrifuges, eye magnets, and massage apparatus. His early work with small motors led to the development of the modern electric fan. In 1911, he produced the first all-metal combination radiographic-fluoroscopic x-ray table, which became the basis of x-ray table design.

In 1940, Mr. Wantz was among pioneers honored at the 150th anniversary of the founding of the U. S. patent system and was elected by the National Association of Manufacturers to its Hall of Fame.

RADIOLOGICAL SOCIETIES: SECRETARIES AND MEETING DATES

Editor's Note: Secretaries of state and local radiological societies are requested to co-operate in keeping this section up-to-date by notifying the editor promptly of changes in officers and meeting dates.

RADIOLOGICAL SOCIETY OF NORTH AMERICA. *Secretary-Treasurer*, Donald S. Childs, M.D., 713 E. Genesee St., Syracuse 2, N. Y.

AMERICAN RADIUM SOCIETY. *Secretary*, John E. Wirth, M.D., 635 Herkimer St., Pasadena 1, Calif.

AMERICAN ROENTGEN RAY SOCIETY. *Secretary*, Barton R. Young, M.D., Germantown Hospital, Philadelphia 44, Penna.

AMERICAN COLLEGE OF RADIOLOGY. *Exec. Secretary*, William C. Stronach, 20 N. Wacker Dr., Chicago 6.

SECTION ON RADIOLOGY, A. M. A. *Secretary*, Paul C. Hodges, M.D., 950 East 59th St., Chicago.

Alabama

ALABAMA RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, J. A. Meadows, Jr., M.D., Medical Arts Bldg., Birmingham 5.

Arizona

ARIZONA RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, R. Lee Foster, M.D., 507 Professional Bldg., Phoenix. Annual meeting with State Medical Association; interim meeting in December.

Arkansas

ARKANSAS RADIOLOGICAL SOCIETY. *Secretary*, Fred Hames, M.D., Pine Bluff. Meets every three months and at meeting of State Medical Society.

California

CALIFORNIA MEDICAL ASSOCIATION, SECTION ON RADIOLOGY. *Secretary*, Sydney F. Thomas, M.D., Palo Alto Clinic, Palo Alto.

EAST BAY ROENTGEN SOCIETY. *Secretary*, Dan Tucker, M.D., 434 30th St., Oakland 9. Meets monthly, first Thursday, at Peralta Hospital.

LOS ANGELES RADIOLOGICAL SOCIETY. *Secretary*, John B. Hamilton, M.D., 210 N. Central Ave., Glendale 3. Meets monthly, second Wednesday, Los Angeles County Medical Association Bldg.

NORTHERN CALIFORNIA RADIOLOGICAL CLUB. *Secretary*, G. A. Fricker, Sacramento Co. Hospital, Sacramento 17. Meets at dinner last Monday of September, November, January, March, and May.

PACIFIC ROENTGEN SOCIETY. *Secretary*, L. Henry Garland, M.D., 450 Sutter St., San Francisco 8. Meets annually at time of California State Medical Association convention.

SAN DIEGO RADIOLOGICAL SOCIETY. *Secretary*, Rex Uncapher, M.D., 7720 Girard Ave., La Jolla. Meets first Wednesday of each month.

SAN FRANCISCO RADIOLOGICAL SOCIETY. *Secretary*, I. J. Miller, M.D., 2680 Ocean Ave., San Francisco 27. Meets quarterly, at the University Club.

SOUTH BAY RADIOLOGICAL SOCIETY. *Secretary*, Ford Shepherd, M.D., 526 Soquel Ave., Santa Cruz. Meets monthly, second Wednesday.

X-RAY STUDY CLUB OF SAN FRANCISCO. *Secretary*, Charles E. Duisenberg, M.D., Palo Alto Clinic, 300 Homer Ave., Palo Alto. Meets third Thursday at 7:45, January to June at Stanford University Hospital, July to December at San Francisco Hospital.

Colorado

COLORADO RADIOLOGICAL SOCIETY. *Secretary*, Wendell P. Stampfli, M.D., 1933 Pearl St., Denver. Meets monthly, third Friday, at University of Colorado Medical Center or Denver Athletic Club.

Connecticut

CONNECTICUT STATE MEDICAL SOCIETY, SECTION ON RADIOLOGY. *Secretary*, Fred Zaff, M.D., 135 Whitney Ave., New Haven. Meets bimonthly, second Wednesday.

CONNECTICUT VALLEY RADIOLOGICAL SOCIETY. *Secretary*, B. Bruce Alicandri, M.D., 20 Maple St., Springfield, Mass. Meets second Friday of October and April.

District of Columbia

RADIOLOGICAL SECTION, DISTRICT OF COLUMBIA MEDICAL SOCIETY. *Secretary*, U. V. Wilcox, M.D., 915 19th St., N.W., Washington 6. Meets third Thursday, January, March, May, and October, at 8:00 P.M., in Medical Society Library.

Florida

FLORIDA RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, A. Judson Graves, M.D., 2002 Park St., Jacksonville. Meets in April and in November.

GREATER MIAMI RADIOLOGICAL SOCIETY. *Secretary*, Maurice Greenfield, M.D., Ingraham Bldg., Miami. Meets monthly, third Wednesday, 8:00 P.M., Veterans Administration Bldg., Miami.

Georgia

ATLANTA RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, J. Dudley King, M.D., 35 Linden Ave., N. E. Meets second Friday, September to May.

GEORGIA RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, Robert M. Tankesley, M.D., 218 Doctors Bldg., Atlanta. Meets in November and at the annual meeting of the State Medical Association.

RICHMOND COUNTY RADIOLOGICAL SOCIETY. *Secretary*, Wm. F. Hamilton, Jr., M.D., University Hospital, Augusta.

Hawaii

RADIOLOGICAL SOCIETY OF HAWAII. *Secretary*, Col. Alexander O. Haff, Tripler Army Hospital, Honolulu. Meets monthly on the third Friday, at Tripler Army Hospital.

Illinois

CHICAGO ROENTGEN SOCIETY. *Secretary*, Benjamin D. Braun, M.D., 6 N. Michigan Ave., Chicago 11. Meets at the University Club, second Thursday of October, November, January, February, March, and April at 8:00 P.M.

ILLINOIS RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, Stephen L. Casper, M.D., Physicians and Surgeons Clinic, Quincy.

ILLINOIS STATE MEDICAL SOCIETY, SECTION ON RADIOLOGY. *Secretary*, Willard C. Smullen, M.D., St. Mary's Hospital, Decatur.

Indiana

INDIANA ROENTGEN SOCIETY. *Secretary-Treasurer*, James N. Collins, M.D., 712 Hume-Mansur Bldg., Indianapolis 4. Annual meeting in May.

Iowa

IOWA X-RAY CLUB. *Secretary*, James McMillen, M.D., 1104 Bankers Trust Bldg., Des Moines. Meets during annual session of State Medical Society, and holds a scientific session in the Fall.

Kansas

KANSAS RADIOLOGICAL SOCIETY. *Secretary*, Charles M. White, M.D., 3244 East Douglas, Wichita 8. Meets annually with State Medical Society.

Kentucky

KENTUCKY RADIOLOGICAL SOCIETY. *Secretary*, Everett L. Pirkey, M.D., Louisville General Hospital. Meets monthly, second Friday, at Seelbach Hotel, Louisville.

Louisiana

ORLEANS PARISH RADIOLOGICAL SOCIETY. *Secretary*, Joseph V. Schlosser, M.D., Charity Hospital of Louisiana, New Orleans 13. Meets first Tuesday of each month.

SHREVEPORT RADIOLOGICAL CLUB. *Secretary*, W. R. Harwell, M.D., 608 Travis St. Meets monthly September to May, third Wednesday.

Maine

MAINE RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, Clark F. Miller, M.D., Central Maine General Hospital, Lewiston. Meets three times a year—Spring, Summer, and Fall.

Maryland

BALTIMORE CITY MEDICAL SOCIETY, RADIOLOGICAL SECTION. *Secretary-Treasurer*, Richard B. Hanchett, M.D., 705-6, Medical Arts Bldg., Baltimore 1. Meets third Tuesday, September to May.

Michigan

* DETROIT X-RAY AND RADIUM SOCIETY. *Secretary*, James C. Cook, M.D., Harper Hospital, Detroit 1. Meets first Thursday, October to May, at Wayne County Medical Society club rooms.

Minnesota

MINNESOTA RADIOLOGICAL SOCIETY. *Secretary*, Leo A. Nash, M.D., 572 Lowry Medical Arts Bldg., St. Paul 2. Meets in Spring and Fall.

Mississippi

MISSISSIPPI RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, John W. Evans, M.D., 621 High St., Jackson 2, Miss. Meets monthly, third Tuesday, at 6:30 P.M., at the Rotisserie Restaurant, Jackson.

Missouri

RADIOLOGICAL SOCIETY OF GREATER KANSAS CITY. *Secretary*, Sidney Rubin, M.D., 410 Professional Bldg., Kansas City, Mo. Meets last Friday of each month.

ST. LOUIS SOCIETY OF RADIOLOGISTS. *Secretary*, Francis O. Trotter, Jr., M.D., 634 North Grand Blvd., St. Louis 3. Meets on fourth Wednesday, October to May.

Nebraska

NEBRASKA RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, Russell W. Blanchard, M.D., 1216 Medical Arts Bldg., Omaha. Meets fourth Thursday of each month at 6 P.M. in Omaha or Lincoln.

New England

NEW ENGLAND ROENTGEN RAY SOCIETY. *Secretary*, L. L. Robbins, M.D., Massachusetts General Hospital, Boston 14. Meets monthly on third Friday, at the Harvard Club, Boston.

New Hampshire

NEW HAMPSHIRE ROENTGEN SOCIETY. *Secretary*, Albert C. Johnston, M.D., 127 Washington St., Keene.

New Jersey

RADIOLOGICAL SOCIETY OF NEW JERSEY. *Secretary*, Nicholas G. Demy, M.D., 912 Prospect Ave., Plainfield. Meets at Atlantic City at time of State Medical Society and midwinter in Elizabeth.

New York

BUFFALO RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, Mario C. Gian, M.D., 610 Niagara St., Buffalo 1. Meets second Monday, October to May.

CENTRAL NEW YORK ROENTGEN SOCIETY. *Secretary*, Dwight V. Needham, M.D., 608 E. Genesee St., Syracuse 2. Meets in January, May, October.

KINGS COUNTY RADIOLOGICAL SOCIETY. *Secretary*, Marcus Wiener, M.D., 1430 48th St., Brooklyn 19. Meets fourth Thursday, October to April (except December), at 8:45 P.M., Kings County Medical Bldg.

NASSAU RADIOLOGICAL SOCIETY. *Secretary*, Joseph J. La Vine, M.D., 259 North Grand Avenue, Baldwin, N.Y. Meets second Tuesday, February, April, June, October, and December.

NEW YORK ROENTGEN SOCIETY. *Secretary*, Irving Schwartz, M.D., 45 E. 60th St., New York 21.

NORTHEASTERN NEW YORK RADIOLOGICAL SOCIETY.

Secretary-Treasurer, John F. Roach, M.D., Albany Hospital, Albany. Meets at University Club, Albany, second Wednesday, October, November, and March. Annual meeting in June.

ROCHESTER ROENTGEN-RAY SOCIETY.

Secretary-Treasurer, Robert J. Bloor, 260 Crittenden Blvd. Meets at Strong Memorial Hospital, last Monday of each month, September through May.

WESTCHESTER RADIOLOGICAL SOCIETY.

Secretary, Walter J. Brown, M.D., Northern Westchester Hospital, Mount Kisco, N. Y. Meets third Tuesday of January and October and at other times as announced.

North Carolina**RADIOLOGICAL SOCIETY OF NORTH CAROLINA.**

Secretary, Waldemar C. A. Sternbergh, 1400 Scott Ave., Charlotte 2. Meets in April and October.

North Dakota**NORTH DAKOTA RADIOLOGICAL SOCIETY.**

Secretary, P. H. Woutat, M.D., 221 S. 4th St., Grand Forks.

Ohio**OHIO STATE RADIOLOGICAL SOCIETY.**

Secretary-Treasurer, Willis S. Peck, M.D., 1838 Parkwood Ave., Toledo 2. Meets with State Medical Association.

CENTRAL OHIO RADIOLOGICAL SOCIETY.

Secretary, Frank A. Riebel, M.D., 15 W. Goodale St., Columbus. Meets second Thursday, October, December, February, April, and June, 6:30 P.M., Columbus Athletic Club, Columbus.

CLEVELAND RADIOLOGICAL SOCIETY.

Secretary-Treasurer, Mortimer Lubert, M.D., Heights Medical Center Bldg., Cleveland Heights 6. Meets at 6:45 P.M. on fourth Monday, October to April, inclusive.

GREATER CINCINNATI RADIOLOGICAL SOCIETY.

Secretary-Treasurer, Harry K. Hines, M.D., 2508 Auburn Ave., Cincinnati 19. Meets first Monday of each month, September to June, at Cincinnati General Hospital.

MIAMI VALLEY RADIOLOGICAL SOCIETY.

Secretary, Geo. A. Nicoll, M.D., Miami Valley Hospital, Dayton. Meets monthly, second Friday.

Oklahoma**OKLAHOMA STATE RADIOLOGICAL SOCIETY.**

Secretary-Treasurer, John R. Danstrom, M.D., Medical Arts Bldg., Oklahoma City.

Oregon**OREGON RADIOLOGICAL SOCIETY.**

Secretary-Treasurer, J. Richard Raines, M.D., Medical-Dental Bldg., Portland 5. Meets monthly, second Wednesday, October to June, at 8:00 P.M., University Club.

Pacific Northwest**PACIFIC NORTHWEST RADIOLOGICAL SOCIETY.**

Secretary-Treasurer, Sydney J. Hawley, M.D., 1320 Madison St., Seattle 4. Meets annually in May.

Pennsylvania**PENNSYLVANIA RADIOLOGICAL SOCIETY.**

Secretary-Treasurer, James M. Converse, M.D., 416 Pine St., Williamsport 8. Meets annually.

PHILADELPHIA ROENTGEN RAY SOCIETY.

Secretary, George P. Keefer, M.D., American Oncologic Hospital, Philadelphia 4. Meets first Thursday of each month at 8:00 P.M., from October to May, in Thomson Hall, College of Physicians.

PITTSBURGH ROENTGEN SOCIETY.

Secretary-Treasurer, Edwin J. Euphrat, M.D., 3500 Fifth Ave., Pittsburgh 13. Meets monthly, second Wednesday, at 6:30 P.M., October to May, at Webster Hall.

Rocky Mountain States**ROCKY MOUNTAIN RADIOLOGICAL SOCIETY.**

Secretary-Treasurer, Maurice D. Frazer, M.D., 1037 Stuart Bldg., Lincoln, Nebr. Next annual meeting Aug. 7-9, 1952, in Denver.

South Carolina**SOUTH CAROLINA X-RAY SOCIETY.**

Secretary-Treasurer, Henry E. Plenge, M.D., 855 N. Church St., Spartanburg. Meets with State Medical Association in May.

South Dakota**RADIOLOGICAL SOCIETY OF SOUTH DAKOTA.**

Secretary-Treasurer, Marianne Wallis, M.D., 1200 E. Fifth Ave., Mitchell. Meets during annual meeting of State Medical Society.

Tennessee**MEMPHIS ROENTGEN CLUB.**

Secretary, John E. White-leather, M.D., 899 Madison Ave. Meets first Monday of each month at John Gaston Hospital.

TENNESSEE RADIOLOGICAL SOCIETY.

Secretary-Treasurer, J. Marsh Frère, M.D., 707 Walnut St., Chattanooga. Meets annually with State Medical Society in April.

Texas**DALLAS-FORT WORTH ROENTGEN STUDY CLUB.**

Secretary, Claude Williams, M.D., Fort Worth. Meets monthly, third Monday, in Dallas odd months, Fort Worth even months.

HOUSTON RADIOLOGICAL SOCIETY.

Secretary, Frank M. Windrow, M.D., 1205 Hermann Professional Bldg.

SAN ANTONIO-MILITARY RADIOLOGICAL SOCIETY.

Secretary, Hugo F. Elmendorf, Jr., M.D., 730 Medical Arts Building, San Antonio 5, Texas. Meets at Brook Army Medical Center, the first Monday of each month.

TEXAS RADIOLOGICAL SOCIETY.

Secretary-Treasurer, R. P. O'Bannon, M.D., 650 Fifth Ave., Fort Worth. Next meeting Jan. 23-24, 1953, San Antonio.

Utah**UTAH STATE RADIOLOGICAL SOCIETY.**

Secretary-Treasurer, Angus K. Wilson, M.D., 343 S. Main St., Salt Lake City. Meets third Wednesday, January, March, May, September, November.

Virginia

VIRGINIA RADIOLOGICAL SOCIETY. *Secretary*, P. B. Parsons, M.D., Norfolk General Hospital, Norfolk.

Washington

WASHINGTON STATE RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, John N. Burkey, M.D., 555 Medical-Dental Bldg., Seattle. Meets fourth Monday, September through May, at College Club, Seattle.

Wisconsin

MILWAUKEE ROENTGEN RAY SOCIETY. *Secretary-Treasurer*, Jerome L. Marks, M.D., 161 W. Wisconsin Ave., Milwaukee 1. Meets monthly on fourth Monday at the University Club.

SECTION ON RADIOLOGY, STATE MEDICAL SOCIETY OF WISCONSIN. *Secretary*, Abraham Melamed, M.D., 425 E. Wisconsin Ave., Milwaukee 2. Meets in October with State Medical Society.

UNIVERSITY OF WISCONSIN RADIOLOGICAL CONFERENCE. Meets first and third Thursday at 4 P.M., September to May, Service Memorial Institute.

WISCONSIN RADIOLOGICAL SOCIETY. *Secretary-Treasurer*, Irving I. Cowan, M.D., 425 East Wisconsin Ave., Milwaukee 2.

CANADA

CANADIAN ASSOCIATION OF RADIOLOGISTS. *Honorary Secretary-Treasurer*, Jean Bouchard, M.D. Assoc.

Hon. *Secretary-Treasurer*, D. L. McRae, M.D. *Central Office*, 1555 Summerhill Ave., Montreal 26, Quebec. Meets in January and June.

LA SOCIÉTÉ CANADIENNE-FRANÇAISE D'ELECTROLOGIE ET DE RADIOLOGIE MÉDICALES. *General Secretary*, Origène Dufresne, M.D., Institut du Radium, Montreal. Meets third Saturday each month.

CUBA

SOCIEDAD DE RADIOLOGÍA Y FISIOTERAPIA DE CUBA. Offices in Hospital Mercedes, Havana. Meets monthly.

MEXICO

SOCIEDAD MEXICANA DE RADIOLOGÍA Y FISIOTERAPIA. *General Secretary*, Dr. Dionisio Pérez Cosío, Marsella 11. Mexico, D.F. Meets first Monday of each month.

PANAMA

SOCIEDAD RADIOLÓGICA PANAMEÑA. *Secretary-Editor*, Luis Arrieta Sánchez, M.D., Apartado No 86, Panama, R. de P.

PUERTO RICO

ASOCIACIÓN PUERTORRIQUEÑA DE RADIOLOGÍA. *Secretary*, Jesús Rivera Otero, M.D., Box 3542 Santurce, Puerto Rico.



ABSTRACTS OF CURRENT LITERATURE

ROENTGEN DIAGNOSIS

The Head and Neck

- SCHIFFER, K. H. Value of Appearance of Ventricle in the Encephalogram..... 892
- SCHIFFER, K. H. Early Changes in Cerebrum and Dysplasia of Base of Skull..... 892
- MOUNT, LESTER A. Treatment of Spontaneous Subarachnoid Hemorrhage..... 892
- EDWARDS, RALPH W. A Roentgenographic Study of Edentulous Jaws..... 893
- BRÜGGER, H. Exacerbation of Calcified Lymph Nodes of the Neck..... 893

The Chest

- BRIGGS, JOHN F. Diagnostic Study of a Patient with an Abnormal X-ray Shadow of the Chest..... 893
- SPRINGETT, V. H. Results of Re-examination by Mass Radiography..... 893
- GAMBACINI, PIERO. Advantages of a Water-Soluble Iodine Compound in Bronchography..... 893
- HURST, ALLEN, AND LEVINE, MORRIS A. New Roentgen Sign of Broncho-Extrapleural Perforation in Lucite Plombage..... 894
- OBLATH, ROBERT W., ET AL. Pulmonary Moniliasis..... 894
- BRUNNER, A. Lung Cancer..... 894
- POPPE, J. K. Bronchiogenic Carcinoma Masquerading as Other Diseases: 200 Cases..... 895
- TAILLENS, J.-P. Value of Bronchologic Information in Diagnosis of Bronchial Cancer. Indications for Bronchoscopy..... 895
- ACKERMAN, LAUREN V., AND TAYLOR, FREDERICK H. Neurogenous Tumors Within the Thorax..... 895
- RUDNIKOFF, ISADORE, AND HEADLAND, COURTENAY I. Pulmonary Changes Following Cholecystectomy..... 896
- NEWMAN, WALTER, AND JACOBSON, HAROLD G. Bizarre Pulmonary Roentgenographic Manifestations in Heart Disease..... 896
- MARKS, MATTHEW O., AND ZIMMERMAN, H. A. Diagnosis of Chronic Cor Pulmonale..... 896
- McKINLAY, C. A. Transient Periods of Cardiac Enlargement Associated with Hypersensitivity to Different Etiologic Agents..... 897
- BEATO NÚÑEZ, VIRGLIO, AND PONS DOMENECH, ELMO R. Heart Puncture. II. Cardioangiography: Clinical and Electrocardiographic Results..... 897
- DOTTER, CHARLES T., AND STEINBERG, ISRAEL. Angiocardiography..... 897
- POWELL, MOSTYN L., AND HILLER, HENRY G. Angiocardiography..... 898
- JÖNSSON, GUNNAR, ET AL. Thoracic Aortography, with Special Reference to Patent

- Ductus Arteriosus and Coarctation of the Aorta..... 898
- D'ERRICO, A. Aortography with Oxygen as the Contrast Medium..... 899
- PEIRCE, E. CONVERSE, II. Percutaneous Femoral Artery Catheterization in Man with Special Reference to Aortography..... 899
- McMICHAEL, J., AND MOUNSEY, J. P. D. A Complication Following Coronary Sinus and Cardiac Vein Catheterization in Man..... 899
- PYKE, DAVID, AND SYMONS, CECIL. Calcification of Aortic Valve and of Coronary Arteries..... 900
- SOUDERS, CARLTON R., ET AL. An Aortic Deformity Simulating Mediastinal Tumor: A Subclinical Form of Coarctation..... 900
- DE GROOT, J. W. C. Bilateral Superior Venæ Cavæ Accompanied by Patent Ductus Arteriosus..... 900
- GLUSHIEN, ARTHUR S., AND MANSUY, MATTHEW M. Superior Vena Caval Obstruction with Survival After Thirty-Six Years..... 900
- LARSSON, Y., ET AL. Congenital Pulmonary Stenosis Without Overriding Aorta..... 901

The Digestive System

- McBRIDE, ANDREW F., JR. Benign Polypoid Tumor of Esophagus..... 901
- ROSENAK, BERNARD D., AND VAN VACTOR, HELEN D. Extramucosal Intramural Enteric Cyst of Esophagus..... 901
- FELDMAN, MAURICE. Retrograde Extrusion or Prolapse of Gastric Mucosa into Esophagus..... 901
- JOHNSTONE, ALAN S. Diagnosis of Early Gastric Herniation at Oesophageal Hiatus..... 902
- WALTHER, O. Lymphosarcoma and Round-Cell Sarcoma of Stomach..... 902
- FANCHER, PAUL S. Syphilis of Stomach..... 903
- HURWITZ, SIDNEY, AND McALENNEY, PAUL F. Trichobezoar in Children..... 903
- JACOBSON, GEORGE, AND CARTER, RAY A. Small Intestinal Rupture Due to Non-Penetrating Abdominal Injury..... 903
- MAYO, CHARLES W., ET AL. Diffuse Familial Polyposis of the Colon..... 903
- WOLLGAST, G. F., AND STAMPFELI, W. P. Cholechooduodenal Fistula Following Perforation of Duodenal Ulcer..... 904
- RIGLER, LEO G. Acute Abdominal Conditions. Roentgen Diagnosis..... 904

The Musculoskeletal System

- HANELIN, JOSEPH, AND ROBBINS, LAURENCE L. Radiology in Bone Pathology..... 905
- NOWELL, STANLEY, ET AL. Multiple Spontaneous "Pseudo-fractures" of Bone (Milkman's Syndrome)..... 906

- GULLEDGE, WILLIAM H., AND WHITE, J. WARREN.
Engelmann's Disease (Progressive Diaphyseal Hyperostosis)..... 906
- INGRAM, FRANK L. Fibrous Dysplasia of Bone and Comparable Conditions in the Jaws.... 907
- EPSTEIN, JOSEPH A., AND DAVIDOFF, LEO M.
Chronic Hypertrophic Spondylosis of Cervical Spine with Compression of Spinal Cord and Nerve Roots..... 907
- KING, DON, AND SECOR, CHARLES. Bow Elbow (Cubitus Varus)..... 907
- MILCH, HENRY. Triphalangeal Thumb..... 908
- WEIR, DAVID R. Eosinophilic Granuloma of Rib..... 908
- THOMPSON, VERNON P., AND EPSTEIN, HERMAN C.
Traumatic Dislocation of the Hip..... 908

The Blood Vessels

- DOTTER, CHARLES T., AND STEINBERG, ISRAEL.
Rapid Serial Contrast Angiography..... 908
- REAGAN, WATTERSON. Translumbar Aortography: Its Value in Renal Pathology.... 908
- DIMITZA, ALEX. Venography of Extremities.... 908
- SCOTT, H. WILLIAM, JR., AND ROACH, JOHN F.
Phlebography of Leg in Erect Position..... 909
- MOORE, H. D. Deep Venous Valves in Aetiology of Varicose Veins..... 909
- ZEMAN, FREDERIC D., AND SCHENK, MAX.
Arteriosclerosis in the Aged..... 910
- FRIEDMAN, EDWARD W., ET AL. Portal Circulation in Experimental Hemorrhagic Shock. In Vivo Roentgen Ray Studies..... 910

Pediatrics

- TEALL, CECIL G. Malignant Disease in Childhood..... 911
- SNYDER, WILLIAM H., JR., ET AL. Retroperitoneal Tumors in Infants and Children.... 911

Technic; Apparatus; Contrast Media

- GEBAUER, A. Body-Section Roentgenography in the Transverse Plane..... 912
- RUNGE, RAY K., ET AL. Roentgenologic Apparatus Attachable to Bell Fracture Table.... 912
- WASCH, MILTON G., AND EPSTEIN, BERNARD S.
Monophen: New Medium for Oral Cholecystography..... 912
- GROSKOPFF, K.-W., ET AL. Thorotrast Injuries. 912
- DE BACKER, JEAN. Accidents Following Intravenous Injection of Contrast Media for Examination of the Urinary System..... 913

RADIOTHERAPY

- WAYTE, A. B. Treatment of Some Disorders of the Pituitary by Radiotherapy..... 913
- BACLESSE, F., ET AL. Treatment of Cancer of Larynx. (Symposium)..... 913
- GARLAND, L. H., AND SISSON, M. A. Cancer of the Ovary..... 915
- COSTOLOW, WILLIAM E. Radiation Therapy in Diseases of the Genito-Urinary Tract..... 915
- ANDREWS, GEORGE C., ET AL. Treatment of Acne Vulgaris..... 915
- HENDTLASS, R. F. Chronic Upper Respiratory Tract Infections..... 916
- LEVY, HAROLD. Roentgen Therapy in Lymphadenosis and Sinusitis in Childhood, with Ten-Year Follow-up of 349 Cases..... 916
- RICHMOND, J. JACKSON. Importance of Radiotherapy in Ankylosing Spondylitis..... 917
- SOUTHARD, SAMUEL C., ET AL. Hemangioma Associated with Thrombocytopenic Purpura. 917
- SARASIN, R., AND DUBOIS-FERRIERE, H. Combinations of Chemotherapy and of Radiotherapy..... 917

RADIOISOTOPES

- CRILE, GEORGE, JR., AND MCCULLAGH, E. PERRY.
Treatment of Hyperthyroidism: An Evaluation of Thyroidectomy, of Prolonged Administration of Propyl Thiouracil, and of Radioactive Iodine..... 918
- SWEENEY, BERNARD J., ET AL. Radioactive Iodine Therapy of Hyperthyroidism: Optimum Dosage..... 918
- FREEDBERG, A. STONE, ET AL. Treatment of Thyroid Carcinoma with Radioactive Iodine (I^{131})..... 919
- HARSHA, WILLIAM N. Radioactive Gold Colloid in Therapy and Palliation of Neoplastic Disease..... 919
- SEMPLE, ROBERT, ET AL. Radioactive Sodium (Na^{24}) in Measurement of Local Blood Flow. 919
- AIKAWA, JERRY K. Significance of the Radio-sodium Space in Human Disease. A Comparison with the Thiocyanate Space..... 920
- WISHAM, L. H., ET AL. Consistency of Clearance of Radioactive Sodium from Human Muscle. 920

RADIATION EFFECTS

- SONNENSCHNEIN, ARNOLD. A Rare Form of Malignant Joint Tumor..... 920

ROENTGEN DIAGNOSIS

THE HEAD AND NECK

Value of the Appearance of the Ventricle in the Encephalogram. K. H. Schiffer. Fortschr. a. d. Geb. d. Röntgenstrahlen 75: 50-54, July 1951. (In German)

The third ventricle, basal cisterns, and the base of the skull show rather characteristic deformities as a result of various anomalies and changes due to trauma, inflammation, etc. The author gives particular attention to the third ventricle, recognizing three general types of enlargement, which he describes as (a) rounded, (b) pear-shaped, and (c) of date-seed type. Two cases in which a characteristic picture was seen are briefly reported.

The rounded or spindle type of deformity results from changes in the brain stem. The pear- or flask-shaped deformity is due to changes in the base of the skull, and the date-seed deformity to cyst formation in the basal cisterns. The type of abnormality and underlying causative factor may usually be determined by encephalography and planimetry.

Sometimes no definite cause may be found for these abnormalities, but very often evidences of encephalitis, trauma, or anomalies of development in the median plane may be observed. Occasionally the change in the pattern of the third ventricle is the only x-ray finding obtainable. Endocrine and other congenital developmental factors undoubtedly play some part in these structural deformities.

Four roentgenograms; 1 drawing.

E. W. SPACKMAN, M.D.
Fort Worth, Texas

Early Changes in the Cerebrum and Dysplasia of the Base of the Skull. K. H. Schiffer. Fortschr. a. d. Geb. d. Röntgenstrahlen 75: 54-59, July 1951. (In German)

The author describes 3 cases from a series of 20 with deformity of the base of the skull and changes in the ventricular pattern due to pathological processes in infancy. As demonstrated roentgenographically, these changes consisted of enlargement of the sphenoid sinus, elevation of the sphenoid plane, and prominence of the optic groove and tuberculum sellae. In some instances the maxillary sinuses appear enlarged also. Encephalography reveals enlargement of the third ventricle and sometimes dilatation of the lateral ventricles with enlargement of the basal cisterns. In 2 of the 3 cases described there was an associated epilepsy, and the third patient was suffering from a "psychopathy."

A meningo-encephalitic process of the basilar type is considered to have been present in early childhood or infancy, with damage to the brain, resulting eventually in the bone changes above described as a secondary process. There is often cyst formation in the prechiasmatic cistern, causing pressure which interferes with the normal development of the temporal lobes. In a similar manner, there may be interference with normal growth of the frontal lobes due to pressure. The author describes the change in form of the base of the skull as being somewhat similar to erosion of vertebral bodies by an aneurysm. In the cases described, however, damage to the base of the brain resulted in secondary growth changes in the adjacent regions of the bone, in an attempt to fill in this defective area.

[Recognition of the above signs and their correct interpretation may help to clear up an otherwise difficult diagnostic problem.—E. W. S.]

Five roentgenograms; 4 drawings.

E. W. SPACKMAN, M.D.
Forth Worth, Texas

Treatment of Spontaneous Subarachnoid Hemorrhage. Lester A. Mount. J. A. M. A. 146: 693-697, June 23, 1951.

Spontaneous subarachnoid hemorrhage is defined as the non-traumatic extravasation of blood into the subarachnoid space. The cause in the majority of cases is rupture of either a saccular or arteriovenous intracranial aneurysm. Such aneurysms are the result of congenital defects in the arterial walls, most often in the circle of Willis, septic or sterile emboli, arteriosclerosis, or a combination of congenital defects and arteriosclerosis. Martland (Am. J. Surg. 43: 10, 1939) attributed 2 per cent of sudden deaths from natural causes to subarachnoid hemorrhage, and Moritz and Zamcheck (Arch. Path. 42: 459, 1946), in a series of 1,000 cases of sudden and unexpected death in young soldiers, found 6.9 per cent to be due to ruptured intracranial aneurysm.

The roentgenogram of the skull may show a curvilinear streak, erosion of one side of the sella turcica, sharpening of one anterior clinoid process, or shift of the pineal gland. Electroencephalography and study of the visual fields may yield information as to the side of the lesions. Relief of headache by occlusion of one carotid artery and not of the other is also of localizing value. Percutaneous arteriography should be done in every patient under the age of sixty unless specific contraindications are present, and in selected patients over that age. The most favorable time for this procedure is usually between the seventh and tenth day after the hemorrhage. It is thought best to obtain bilateral carotid arteriograms, since multiple aneurysms are present in approximately 10 per cent of the cases. Compression of the carotid artery for ten minutes (Matas test) and tests for sensitivity to diodrast must be performed before the arteriographic study is undertaken.

Surgical therapy consists in a direct intracranial approach to the aneurysm or ligation of the arteries in the neck which supply the blood to the aneurysm. Prior to the latter procedure, carotid occlusion for thirty minutes is done to determine the extent of collateral circulation. The various intracranial procedures are described. It is emphasized that blood must be available for arterial transfusion if necessary; also a double-suction apparatus must be at hand to remove the blood quickly should the aneurysm rupture during its exposure.

The mortality rate in 752 collected cases treated conservatively (excluding series in which autopsy material alone was used) was 48 per cent. Actually it is thought that the mortality would be even higher with a longer follow-up, since recurrent hemorrhage is frequent. The mortality rate for 469 operatively treated patients was 14 per cent. In view of the above observations, it is advised that the pathologic process be outlined by arteriography and surgical treatment be undertaken.

Seven roentgenograms; 3 tables.

I. MESCHAN, M.D.
University of Arkansas

A Roentgenographic Study of Edentulous Jaws.

Ralph W. Edwards. J. Kansas M. Soc. 52: 267, June 1951.

The purpose of the present study was to determine the number of unerupted teeth, fractured roots, foreign bodies, and residual infections contained within clinically normal edentulous jaws. A total of 1,050 individuals were studied, including 800 patients with both jaws edentulous and 250 with either the maxillae or mandible edentulous and the other jaw partly or wholly dentate. The age range was eighteen to seventy-eight years, and the distribution between the sexes was fairly even.

Complete intra-oral roentgenographic surveys were made of 1,850 jaws—974 maxillae and 876 mandibles. In 64.5 per cent of this number there were no significant findings. Unerupted teeth were demonstrated in 3.3 per cent, over one-half being maxillary third molars. In 26 per cent fractured root fragments were contained within the jaws; about two-thirds of these were in the maxilla, especially in the first premolar and first and second molar regions. These represent a failure of total removal of teeth in 1.3 per cent of 29,560 extractions. In 3 patients the root of a maxillary first molar was found within the maxillary sinus.

In 33 of the 1,050 individuals there were foreign bodies in the jaws, chiefly amalgam fillings, though occasionally fragments of instruments were discovered, and in one instance radon seeds implanted a year earlier for control of carcinoma.

Median anterior maxillary cysts were found in 0.9 per cent of the patients, and radicular cysts in 1.2 per cent; 3.9 per cent had areas of residual infection remaining from dental extractions.

In summary, over one-third of the patients had jaws apparently normal, yet showing on x-ray examination conditions that could be considered as detrimental to health. The author urges that physical examinations include x-ray surveys of the jaws, even if these are edentulous.

I. MESCHAN, M.D.

University of Arkansas

Exacerbation of Calcified Lymph Nodes of the Neck and Its Roentgen Identification. H. Brügger. Fortschr. a. d. Geb. d. Röntgenstrahlen 75: 63-65, July 1951. (In German)

Tuberculous lymph nodes which do not break down usually calcify within two years. The appearance of calcium, however, is not a reliable indication of a cure. The nodes may assume activity and break down at any time during a period of at least ten years, with spreading of the infection or fistula formation.

In the cervical nodes, the initial appearance is usually that of small areas of fine flecks of calcium, surrounded by a fairly sharply demarcated thickened soft-tissue shadow. The x-ray indication of reactivity is often enlargement of the area, with the calcium deposit becoming more diffuse, coarser, and less well defined, especially about the periphery. In many instances the surrounding soft-tissue shadow increases in density. Clinically there is associated painful swelling of the nodes.

The warning signs of reactivity, especially the tendency to perforation of a node, may often be recognized radiologically before it is apparent from the clinical and physical aspects of the case.

Five roentgenograms.

E. W. SPACKMAN, M.D.

Fort Worth, Texas

THE CHEST

Suggestions for the Diagnostic Study of a Patient with an Abnormal X-ray Shadow of the Chest. John F. Briggs. Dis. of Chest 20: 24-34, July 1951.

The author contends that the final responsibility for the diagnosis of chest lesions rests with the clinician. The roentgenologist can only describe what he sees on the roentgenogram, interpreting the findings in the light of former experience. He cannot make a bacteriologic or histologic diagnosis.

To aid the physician in establishing a diagnosis, suggestions are offered for history taking; physical examination; laboratory studies, including the tuberculin test and demonstration of the tubercle bacillus; specialized investigations such as bronchoscopy, bronchography, kymography, and others; and periodic follow-up clinical and roentgenologic studies. "Most important," the author advises the clinician, "make use of the roentgenologist as your consultant."

Twenty roentgenograms are reproduced, demonstrating atypical pneumonia, ornithosis, calcification due to histoplasmosis, pulmonary infarct, hemosiderosis, pneumonitis with an eosinophilia, Friedländer bacillus infection, sarcoid, and arteriovenous fistula.

HENRY K. TAYLOR, M.D.

New York, N. Y.

Results of Re-examination by Mass Radiography. V. H. Springett. Brit. M. J. 2: 144-148, July 21, 1951.

The analysis of mass radiography results reported here was undertaken in the hope of obtaining some evidence of relative attack rates at different periods of life. The study was based on observations in a unit examining Civil Servants in the London area and earlier records from the unit were available for comparison.

The following conclusions were reached:

An initial mass survey gives a higher incidence of active tuberculosis than similar examination of a group previously examined. Until an area has been completely covered, therefore, every attempt should be made to examine the greatest possible number of individuals for the first time.

At repeat mass radiographic examinations the highest incidence of new lesions is in young adults of both sexes. A few cases are found in older males, but practically none in older females. The main effort of repeat examinations, therefore, should be to obtain the best attendance of young adults, since the possibility of persons over thirty-five years with normal roentgenograms subsequently developing tuberculosis is slight.

It is essential that some arrangements be made for the supervision of healed or healing lesions in older individuals, particularly males. Annual radiological supervision would strain existing facilities, and repeated examinations by mass technic are not satisfactory for comparison studies. If radiological supervision cannot be arranged, at the least the individuals and their physicians should be informed of the finding, so that full investigation could follow the occurrence of symptoms.

FRANK T. MORAN, M.D.

Lancaster, Penna.

Advantages of a Water-Soluble Iodine Compound in Bronchography. Piero Gambaccini. Radiol. med. (Milan) 37: 540-550, July 1951. (In Italian)

This is one of several articles which have appeared recently in the European literature regarding the use of

resorbable water-soluble media for bronchography. The author has employed "Joduron B" for bronchography in 50 patients and has obtained excellent visualization of the bronchial tree, as shown in his illustrations. The advantages of a water-soluble resorbable medium are the lack of opaque shadows which usually obscure the lung after the injection of iodized oil. The disadvantages are the rapid resorption of the medium and the necessity for a more complete anesthesia of the bronchial tree.

Twenty-five roentgenograms.

CESARE GIANTURCO, M.D.
Urbana, Ill.

A New Roentgen Sign of Broncho-Extrapleural Perforation in Lucite Plombage. Allen Hurst and Morris A. Levine. *Am. J. Roentgenol.* 66:37-43, July 1951.

Following extrapleural pneumonolysis with lucite plombage, one of the most serious complications is extrapleural tuberculous empyema, due to slow perforation of a peripheral caseous area directly beneath the extrapleural shelf. The role of the lucite itself, as a cause of this complication, is debatable.

Among 70 cases in which lucite plombage was used by the authors, extrapleural perforation developed in 2. Two other patients with perforation following similar treatment elsewhere were also seen. In all these cases a common roentgen sign was discovered, which should make possible an early diagnosis of this complication. In 3 instances it was the only evidence of perforation. It consists in a clear space, representing air, surrounding and clearly outlining the lucite spheres.

Soon after introduction of the spheres, a fibrinous change occurs in the interstices between them, producing an opacity in the roentgenogram. With perforation, air seeps into the spaces and the picture changes, as described above. If a moderate amount of serum is present, fluid levels may also be seen.

Fifteen roentgenograms.

JOSEPH P. TOMSULA, M.D.
Baton Rouge, La.

Pulmonary Moniliasis. Robert W. Oblath, Douglas H. Donath, Herbert G. Johnstone, and Wm. J. Kerr. *Ann. Inn. Med.* 35:97-116, July 1951.

Although pulmonary moniliasis is found in all climates and among all racial, age, and sex groups, its exact incidence is unknown. There are (1) a mild type, with cough and a mucopurulent sputum; (2) an intermediate type, with low-grade fever, some bronchial hypersecretion, moderately severe cough, and sometimes dyspnea; (3) a severe type, which, when acute, may resemble lobar or bronchopneumonia, and when chronic, may mimic pulmonary tuberculosis. Fever, weight loss, night sweats, cough, dyspnea, chest pain, anemia, and emaciation often are present in the severe cases, and hemoptysis is frequently found. Physical examination reveals signs of pleural thickening and patchy consolidation in the lungs. Healing, with a high degree of fibrosis, may lead to chronic dyspnea, cough, and eventually cor pulmonale.

Pulmonary moniliasis is diagnosed by the clinical manifestations together with certain radiologic evidence, the consistent finding of *C. albicans* in large numbers, in carefully collected sputum specimens, and the absence of *M. tuberculosis*. The mere presence of *C. albicans* is not an indication of the disease.

The roentgenographic findings generally are those of extensive hilar and peribronchial thickening, with lesions, usually of larger size than those found in miliary tuberculosis, occurring in scattered patchy foci or in local or widespread consolidation. The number of lobes involved is variable. The lesions are labile, and serial roentgenograms reveal the fluctuant nature of the infection. Cavitation resembling that in bronchiectasis may be seen. Extensive fibrosis with widespread infiltration throughout the lungs appears to be a common result of the disease.

The erythrocyte sedimentation rate is elevated in active infection. A normal white blood cell count is commonly found, with occasional leukocytosis. Skin tests, agglutination tests, complement-fixation tests and precipitin tests for *C. albicans* are not dependable for accurate diagnosis.

Treatment has been found uniformly difficult and unsatisfactory.

The records of six patients at the University of California Hospital with characteristic clinical findings suggesting pulmonary moniliasis are presented, with autopsy findings in one.

Two roentgenograms; 2 photomicrographs; 1 table.
STEPHEN N. TAGER, M.D.
Evansville, Ind.

Lung Cancer. A. Brunner. *Schweiz. med. Wchnschr.* 81:653-659, July 14, 1951. (In German)

This review of carcinoma of the lungs is based on observations at the Surgical Clinic of the University of Zurich. The great improvement in prognosis during the last ten years is almost exclusively due to surgery. Only very rarely is a cure possible through radiotherapy. More than half of the cases, however, are inoperable when they are first observed, in most instances because of extension of the tumor to the bifurcation and trachea, extensive regional metastases within the hilus and the mediastinum, and distant metastases in the opposite lung, the liver, the brain, or the skeleton.

Only 6.7 per cent of the author's cases occurred in women. He believes that there is no doubt that the prevalence of the lesion in men is due to the use of tobacco. The average age was fifty-four years. The great majority of the lesions were squamous-cell carcinomas. Undifferentiated small-cell bronchial carcinomas were in the minority and were much less favorable. Only one case of sarcoma was observed. Of the small-cell carcinomas, only 22.8 per cent were resectable. Of the squamous-cell carcinomas, 61 per cent were resectable. Radical pneumonectomy is probably the most desirable operation. Only occasionally, in early cases, a lobectomy may be sufficient.

The most prominent symptoms were cough, an increase in the sedimentation rate, expectoration (52 per cent of the cases had bloody sputum), and occasional slight fever. For diagnosis, x-ray examination is the most important procedure. Any abnormal shadow which cannot be diagnosed immediately as a benign tumor, a cyst, or as a manifestation of tuberculosis, should be regarded as possible carcinoma, and no effort should be spared to establish the diagnosis definitely. For this purpose bronchoscopy will serve in the majority of cases. This should be carried out with a water-soluble iodine preparation (Joduron B). Oil preparations should not be used. In coin-like lesions in the periphery of the lungs, exploratory aspiration is indi-

cated. These cases should be carefully observed and, if any increase in the size of the tumor is noticed, a surgical exploration should be done.

As in carcinoma elsewhere, the early diagnosis is extremely important. Every middle-aged smoker should have an x-ray examination at least once a year and, if a shadow is obtained that cannot be explained easily, bronchography and bronchoscopy should be done. If the diagnosis still cannot be made, exploration is advisable.

Nine roentgenograms; 5 diagrams.

WM. A. MARSHALL, M.D.
Chicago, Ill.

Bronchiogenic Carcinoma Masquerading as Other Diseases. A Review of 200 Cases. J. K. Poppe. *Dis. of Chest* 20: 75-81, July 1951.

There is a delay in the diagnosis of cancer of the lung due primarily to two factors: first, camouflage by secondary pulmonary infection; second, lack of suspicion of a malignant lesion. In a review of 200 cases, the author found 43.5 per cent inoperable on clinical examination alone; another 32.5 per cent proved inoperable on exploration, and 4 per cent of the patients refused surgery, making the operability rate for the series 20 per cent. In only 45 per cent of the entire group were positive bronchoscopic biopsy findings obtained.

The symptoms of pulmonary carcinoma may mimic those of a wide variety of diseases, including rheumatic pains in the extremities, arthralgia, upper abdominal discomfort, etc. In Pancoast tumors a Horner's syndrome may be the presenting symptom, or cerebral metastases may be responsible for the first complaints. Ten per cent of the author's series of 200 patients had early symptoms which were unrelated to the chest. Still other cases may masquerade as pneumonia, segmental atelectases, pulmonary abscess, tuberculoma, aneurysm, or mediastinal tumor.

The author believes that unexplained peripheral lung shadows "should be treated in the same manner as a palpable mass in the breast or abdomen—by exploration and resection." Of 35 solitary peripheral lung lesions resected during a period of four years, 67 per cent proved to be new growths and 32 per cent represented tuberculomas or pseudotumors. Bronchoscopic examinations in all of this group were negative, and no tubercle bacilli were found in the sputum. Atypical apical infiltrations with negative sputum should also be explored, for apical lung carcinomas are notoriously difficult to diagnose in an early stage, often presenting their first signs and symptoms in the neck or brain. An even more difficult problem is presented by an upper lobe cancer associated with an active tuberculosis and a positive sputum. Three such cases were present in the series reported here. A pulmonary carcinoma may be obscured by a pyogenic empyema.

Six roentgenograms; 1 photograph.

HENRY K. TAYLOR, M.D.
New York, N. Y.

The Value of Bronchologic Information in the Diagnosis of Bronchial Cancer. Indications for Bronchoscopy. J.-P. Taillens. *Schweiz. med. Wchnschr.* 81: 608-681, July 14, 1951. (In French)

Statistical studies indicate that two to seven months elapse between the appearance of clinical symptoms and

bronchologic exploration in patients with bronchogenic carcinoma.

Juxtahilar carcinomas constitute 85 per cent of all bronchogenic cancers; of these, 80 per cent involve large bronchi and 5 per cent the juxtahilar bronchioles. The remaining 15 per cent of bronchogenic carcinomas involve the peripheral bronchioles. Bronchoscopic visualization, biopsy, and removal of secretions for cell studies result in a definite diagnosis in 60 to 70 per cent of cases and a probable diagnosis in 15 to 20 per cent. Bronchography may be of value in confirming localization of the lesion and at times gives a characteristic picture which helps to confirm or establish a doubtful diagnosis.

Fifty-two illustrations, including sketches, roentgenograms, and reproductions in color of bronchoscopic pictures.

CHARLES M. NICE, M.D.
University of Minnesota

Neurogenous Tumors Within the Thorax. A Clinicopathological Evaluation of Forty-Eight Cases. Lauren V. Ackerman and Frederick H. Taylor. *Cancer* 4: 669-691, July 1951.

The authors present a series of 48 cases of neurogenous tumor of the thoracic cage which have been seen at the Washington University School of Medicine and Barnes Hospital, St. Louis, Mo. All of the cases have been followed. The tumors are classified as follows: (1) tumors of the sympathetic nervous system, including ganglioneuroma (well differentiated), ganglioneuroblastoma (moderately well differentiated), and neuroblastoma (poorly differentiated), and (2) tumors of nerve-sheath origin, including neurilemoma, ancient neurilemoma, neurofibroma, and malignant schwannoma (neurofibrosarcoma).

There are few specific signs or symptoms that would allow classification of these neoplasms on a clinical or radiographic basis. In general, the more undifferentiated tumors of the sympathetic nervous system occur in young children. On the other hand, well differentiated tumors of the same nature are also seen in this age group. It is impossible to determine by the signs, symptoms, or roentgenographic appearance whether a given tumor is benign or malignant. A tumor of the posterior mediastinum in the presence of obvious von Recklinghausen's disease has a greater chance of being malignant than if no such stigmata are present. Fifteen of the authors' 48 patients had no symptoms, and a mediastinal tumor was picked up on routine roentgenographic examination. However, all of the malignant tumors of the sympathetic nervous system and of nerve-sheath origin produced symptoms. Pain was the most common symptom, occurring in 20 patients. It was usually due to involvement of the intercostal or brachial nerve plexus. A Horner's syndrome was present in 6 cases, but was not found to be of significance from the standpoint of prognosis. In only 1 of these 6 cases was the tumor malignant.

The roentgenographic appearance of these groups of tumors is very similar. Practically all are located in the posterior mediastinum, presenting a sharply circumscribed, round or oval homogeneous mass. Local areas of calcification occur in both the benign and malignant neoplasms, but are not a common finding. Rarely a neurogenous tumor will be encountered in the anterior mediastinum; those that do occur in that area are invariably derived from the intercostal or brachial nerve plexus. All of the tumors may grow to a large

size and may produce some deviation of the mediastinum. Reaction in the surrounding tissues is usually not present. Erosion of the adjacent ribs or spine does not necessarily indicate malignancy, being largely a pressure phenomenon. Ragged bone destruction locally and distantly indicates a malignant tumor. The neuroblastomas are often less discrete and practically always located superiorly in the posterior mediastinum. The neurogenous tumor is the most common neoplasm of the posterior mediastinum, and should be the presumptive diagnosis.

Seventeen of the authors' 48 patients had tumors of the sympathetic nervous system. Treatment of choice in this group is surgical removal, though in the case of the neuroblastomas, which are locally invasive, this is usually impossible. Many of these latter tumors, however, are extremely radiosensitive and, if there is any question of inadequate excision or when only a biopsy has been done, well planned and thorough irradiation is imperative. In well differentiated ganglioneuromas, postoperative irradiation is of no value. Of 7 patients in this series with ganglioneuromas, all were living and well at the time of the report. Of 7 patients with ganglioneuroblastoma, 3 were living and well. None of the 3 patients with neuroblastoma survived.

In 31 of the 48 patients the tumors were of nerve-sheath origin. Four of these were malignant. The treatment of this group of tumors is surgical removal. Twenty-six of the 27 patients with neurilemmomas, ancient neurilemmomas, and neurofibromas were living and well at the time of the report, without evidence of disease. Three of the patients with malignant schwannoma had died. The authors emphasize the difficulty in determining the malignancy of the tumors of nerve-sheath origin, and suggest that their malignant nature has been overestimated.

Forty-four figures, including 14 roentgenograms; 3 tables.
DONALD S. CHILDS, JR., M.D.
Rochester, Minn.

Pulmonary Changes Following Cholecystectomy. Isadore Rudnikoff and Courtenay I. Headland. *J. A. M. A.* 146: 989-991, July 14, 1951.

In 40 consecutive patients undergoing cholecystectomy, chest roentgenograms were obtained within twenty-four hours before operation, on the fourth post-operative day, and again at the time of discharge, to determine the incidence of significant pulmonary complications. All the preoperative films were normal. Twenty-eight of the 40 patients (70 per cent) showed atelectasis or pneumonic infiltration on the first post-operative film, and in 7 of these some residual changes were evident on the films obtained on the day of discharge.

To prevent such pulmonary complications, the authors urge that excessive sedation before and after operation and restrictive dressings be avoided, that measures be taken to combat dehydration, and that early ambulation be practised.

Three roentgenograms. ZAC F. ENDRESS, M.D.
Pontiac, Mich.

Bizarre Pulmonary Roentgenographic Manifestations in Heart Disease. Walter Newman and Harold G. Jacobson. *Am. Heart J.* 42: 184-193, August 1951.

The authors present the case histories and unusual roentgenograms of four patients with heart failure. In

the first case nodular densities were demonstrable in each hemithorax, which were ultimately interpreted as multiple interlobar pleural effusions. These disappeared under adequate therapy. In the second case the chest roentgenogram showed a homogeneous density overlying the entire right hemithorax, simulating a massive effusion. This was eventually considered as representing a dependent edema and largely disappeared with change in position. Upper lobe changes in the third case were first thought to be tuberculous but, following adequate therapy for congestive heart failure, were no longer demonstrable. The fourth case presented a rounded nodular shadow within the right apex which proved at autopsy to be an infarct.

The above findings were observed in addition to the usual changes of congestion and pulmonary edema associated with cardiac failure.

Eight roentgenograms. HENRY K. TAYLOR, M.D.
New York, N. Y.

Roentgen and Differential Diagnosis of Chronic Cor Pulmonale. Matthew O. Marks and H. A. Zimmerman. *Am. J. Roentgenol.* 66: 9-28, July 1951.

This is one of a triad of articles on chronic cor pulmonale. The other papers, which had not yet appeared, deal, respectively, with the correlation of clinical and autopsy observations and physiological findings in patients studied by cardiac catheterization.

For the present study 102 cases proved at autopsy between 1931 and 1947 were reviewed. Of these, the first 50 (1931-1940) were previously reported by Scott and Garvin (*Am. Heart J.* 22: 56, 1941). In this group, 10 out of 19 cases studied roentgenographically were reported by the radiologist as showing enlargement of the pulmonary conus or the body of the right ventricle. In 39 of the 52 more recent cases, roentgen examination afforded a correct diagnosis in only 9.

The failures to reach a diagnosis are attributed to (1) omission of a roentgenoscopic examination, usually because of the poor condition of the patient; (2) lack of roentgenograms in both oblique positions as well as the postero-anterior projection; (3) the presence of extensive pulmonary changes obscuring the cardiac outlines. In spite of these shortcomings, the authors believe that a correct diagnosis should have been possible in some instances.

The findings to be sought during roentgenoscopy and on the subsequent films are as follows.

1. In the postero-anterior position: (a) a bulge in the region of the main pulmonary artery, along the left cardiac border below the aortic knob; (b) a widening of the heart shadow in the region of the conus; (c) prominence of the hilum due to postero-anterior enlargement; (d) pulmonary emphysema (usually present); (e) the transverse cardiac diameter need not be increased.

2. In the right anterior oblique position: (a) anterior bulge of conus; (b) increased oval density of the pulmonary trunk at its bifurcation into the left and right pulmonary arteries; (c) encroachment by the heart upon the retrosternal space; (d) lack of significant displacement of the barium-filled esophagus in the region of the left atrium.

3. In the left anterior oblique position: (a) encroachment on the retrosternal space by the enlarged right ventricle; (b) interventricular groove displaced posteriorly and upward; (c) increased circular density at the bifurcation of the pulmonary trunk.

An excellent discussion of differential diagnosis is

given, with numerous roentgenograms to illustrate the differential features. Conditions to be excluded are:

1. Congenital heart disease: (a) interatrial septal defect; (b) Lutenbacher's syndrome; (c) high interventricular septal defect; (d) patent ductus arteriosus; (e) Eisenmenger's complex; (f) pulmonic stenosis.
2. Mitral stenosis.
3. Thyroid heart disease.
4. Cardiac failure.
5. Aneurysm of the pulmonary artery.
6. Kyphoscoliosis.
7. Age and habitus.
8. Ayerza's disease.
9. Idiopathic dilatation of the pulmonary artery.

Thirty-eight roentgenograms.

JOSEPH P. TOMSULA, M.D.
Baton Rouge, La.

Transient Periods of Cardiac Enlargement Associated with Hypersensitivity to Different Etiologic Agents: Report of a Case. C. A. McKinlay. *Ann. Int. Med.* 35: 226-233, July 1951.

The development in a twenty-year-old man of abrupt enlargement of the cardiac silhouette, with signs of pericarditis and of left pleural effusion, occurring transiently in the course of serum sickness, was previously reported by the writer (*Journal Lancet* 68: 61, 1948). The present report deals with the occurrence in the same individual, shortly after convalescence from the serum sickness, of pharyngitis and tonsillitis, followed by a second transient enlargement of the heart. The similarity of the two episodes, apparently due to two different etiologic agents, has stimulated consideration of the common pathogenic mechanism of hypersensitivity.

In contrast to the precipitation of the first episode of cardiac enlargement, pericarditis, and pleuritis, by the injection of tetanus antitoxin, the second was initiated by pharyngitis and is attributed to sensitivity to bacterial products. Fever, leukocytosis, and increased sedimentation rate were followed by a latent afebrile period. On the sixth day after the temperature and pulse rate had returned to normal, cardiac signs developed, similar to those of the first episode. The decrease in titer of the heterophil antibody reaction to normal limits (1 to 8) made the previous elevation (1 to 64), noted during serum sickness, more significant in support of this diagnosis. Increase in the cardiac silhouette was readily demonstrated in both bouts. No evidence of deficiency disease of any type was encountered.

The author believes that hypersensitivity, producing conditions favorable to cardiac enlargement, was the common mechanism in the two episodes described.

The similarity of the course of events to that in rheumatic fever is held to support the concept that the latter disease represents a tissue injury of characteristic type due to an anaphylactic reaction rather than the result of a specific etiologic agent.

Three roentgenograms; 3 electrocardiograms.

STEPHEN N. TAGER, M.D.
Evansville, Ind.

Heart Puncture. II. Cardioangiography: Clinical and Electrocardiographic Results. Virgilio Beato Núñez and Elmo R. Ponsdomenech. *Am. Heart J.* 41: 855-863, June 1951.

In an earlier paper the authors considered the physiological and experimental aspects of heart puncture and

described their technic (Ponsdomenech and Beato Núñez: *Am. Heart J.* 41: 643, 1951. *Abst. in Radiology* 58: 452, 1952). Here they report the results of introducing radiopaque material by trocar directly into the ventricles in man. Fifty cubic centimeters of 75 per cent diodrast were injected into the right ventricle under a pressure of 25 pounds and into the left under a pressure of 30 pounds.

Forty-five punctures were made in 30 patients with no fatal accident. The average age was sixty years. The clinical diagnoses were varied, but the largest single group (10) had carcinoma of the lung. The general condition of the patients was mainly fair to bad. The right ventricle was punctured 30 times, the left only 15 times.

Most of the patients had no subjective complaints after the procedure. A few had slight disturbance in the upper abdomen or retrosternal region. Several patients had tachycardia during the injection of the diodrast, with rapid return of the pulse to normal. The blood pressure did not change during puncture but dropped 10 to 40 mm. Hg systolic during the injection of the diodrast. The electrocardiographic changes consisted only of ventricular extrasystoles when the trocar penetrated the ventricular wall. On four occasions there was a transient right bundle branch block of short duration.

It was felt that the films showed better opacification than in the usual angiocardigraphic study, particularly of the left ventricle and great vessels.

Five of the patients died of lung carcinoma after varying periods of time. No evidence of the cardiac puncture was seen in 4 patients. The fifth patient died seven days after puncture and showed small blood clots in the pericardial sac in a resorbing stage.

Eight roentgenograms; 4 electrocardiograms.

PAUL W. ROMAN, M.D.
Baltimore, Md.

Angiocardigraphy. Charles T. Dotter and Israel Steinberg. *Circulation* 4: 123-138, July 1951.

The value and limitations of angiocardigraphy are carefully presented in relation to various cardiac, pulmonary and mediastinal lesions.

In coarctation of the aorta, in which surgically significant differences in the site of the stenosis are compatible with identical clinical findings, angiocardigraphy is a definitive preoperative means of diagnosis. For this purpose it is best performed in the left anterior oblique projection. The site of the coarctation is generally 1 to 2 cm. distal to the origin of the left subclavian artery, the length of the intervening stub often being the determining factor in the choice of operative procedure. The collateral vessels are well shown, as is the dilatation of the ascending aorta. Angiocardigraphy is also often of value in differentiating congenital aneurysms of the aortic arch from mediastinal tumors in young patients.

Intracardiac left-to-right shunts due to isolated interatrial or interventricular defects are best diagnosed by clinical means or cardiac catheterization, while patent ductus arteriosus is more reliably diagnosed by stethoscope. Angiocardigraphy may establish but never excludes the diagnosis of pulmonary stenosis.

Contrast visualization is unique in its ability to demonstrate the anatomy of anomalous pulmonary veins entering the right atrium or its immediate tributaries. In cyanotic congenital heart disease, angio-

cardiographic interpretation is most profitably directed toward the identification of specific lesions such as the presence and degree of overriding of the aorta and the state of the pulmonary circulation. It can be relied upon to show gross reduction in pulmonary blood flow and usually indicates the route by which the blood reaches the lungs—i.e., through dilated, normal or stenotic pulmonary arteries, bronchial arteries, or a patent ductus.

In the study of arteriosclerosis and hypertension the role of angiocardiology has been primarily academic. It has demonstrated dilatation of the superior vena cava, congestion of the pulmonary vessels, and delayed circulation rate in heart failure.

The method is diagnostic of syphilitic aortitis in many cases in the absence of clinical or conventional radiographic abnormality. The prime points are: dilatation of mid-ascending aorta beyond 38 to 40 mm. in absence of hypertension, aortic insufficiency or congenital anomalies; irregularity of the aortic lumen; variations in thickness of aortic wall; tortuosity of the aorta.

In mitral stenosis, angiocardiology has demonstrated that the prominence in the left mid-cardiac border is caused by the dilated left auricular appendage and pulmonary artery and not the pulmonary conus. The prominence of the anterior heart border seen to encroach upon the retrosternal space has been shown to be due not to enlargement of the right ventricle so much as to left atrial dilatation causing anterior displacement of the superior vena cava and right heart chambers.

By defining the limits of cardiac chambers, angiocardiology offers an accurate means of showing the presence of and estimating the amount of pericardial effusion. It clearly defines aneurysm of the left ventricle, and in dissecting aneurysm of the aorta it shows abrupt narrowing of the lumen at the site of dissection, with sudden increase in thickness of aortic walls. Compression and displacement of major vessels by mediastinal tumors may also be demonstrable by this method and it may be helpful in the differentiation between benign and malignant changes.

Circumscribed pulmonary tumors, whether benign or malignant, tend to displace vessels rather than occlude them, whereas the invasive nature of cancer causes irregular alterations in the contour of vascular lumens, frequently occluding major pulmonary arteries. Angiocardiology may indicate inoperability by showing neoplastic involvement of vascular structures beyond the limit of surgical resectability.

In emphysema, pulmonary fibrosis, tuberculosis and pulmonary heart disease angiocardiology may add valuable confirmatory evidence as to extent of involvement, operative procedures, etc. The diagnostic accuracy of the method in pulmonary arteriovenous fistula is of great aid in surgical cure.

Seventeen angiocardigrams; 8 drawings.

BERNARD S. KALAYJIAN, M.D.
Detroit, Mich.

Angiocardiology. Mostyn L. Powell and Henry G. Hiller. *M. J. Australia* 2: 116-119, July 28, 1951.

Analyzing their experiences with 98 angiocardigrams obtained in 43 children, in the Children's Hospital, Melbourne, Australia, the authors are encouraged by the contributions this method makes toward accurate diagnosis of cardiovascular anomalies.

They use a cassette tunnel which enables them to take 2 films per second. "Vasiodone," a 70 per cent diiodone compound, is injected into a cannula inserted in an elbow vein with a special syringe and films are obtained with the patient lying down, in anteroposterior and left anterior oblique positions. Anesthesia was used in the earlier cases but respiratory difficulties encountered in some instances led to its discontinuance in favor of mild barbiturate sedation.

In interpretation of the films, attention is given to variations in flow of the opaque medium, size and position of great vessels, and abnormal communications. Indirect evidence, such as opacification of a structure at an unexpected time, is also taken into consideration.

The four normal views are illustrated, i.e., the right and left sides of the heart in both anteroposterior and left anterior oblique positions, and representative films and short case summaries are given for tetralogy of Fallot, pulmonary stenosis, aortic stenosis, patent ductus, and pulmonary arteriovenous aneurysm.

Twelve roentgenograms with accompanying line drawings.

ZAC F. ENDRESS, M.D.
Pontiac, Mich.

Thoracic Aortography, with Special Reference to Its Value in Patent Ductus Arteriosus and Coarctation of the Aorta. Gunnar Jönsson, Bror Brodén, and Johan Karnell. *Acta radiol., Suppl.* 89, 1951.

This monograph on thoracic aortography opens with a historical survey, followed by a discussion of the technique and the application of the procedure in patent ductus arteriosus and coarctation of the aorta.

Two cassette changers with individual x-ray tubes are placed in such a manner that simultaneous exposures may be made in both the sagittal and coronal planes of the body. Ten films are exposed in each plane over a period which may be varied from five to seventeen seconds. Under fluoroscopic control the largest possible catheter (F 6 to F 10 or larger), previously moistened with blood, is threaded retrogradely through the right radial artery until its tip lies halfway down the ascending aorta at a point just above the aortic valves. Through the catheter a calculated volume (1 to 1.2 c.c. per kilogram of body weight) of 70 per cent umbradil is injected as rapidly as possible. A specially constructed metal syringe and pressure lever aid in rapid injection.

Reactions following the examination include the well known general reaction common to iodides, transient local damage to the brain and kidneys, and initial bradycardia followed by transient tachycardia. Caution is exercised in placing the tip of the catheter lest it occlude the orifice of a coronary artery. The authors have abandoned the use of a cannula in the common carotid artery for injection of the medium as being dangerous and technically difficult.

Patent ductus arteriosus was diagnosed in 25 cases. Surgical proof of the abnormality was obtained in 21 cases; 4 cases did not come to operation. Two patients had coarctation of the aorta as well as a patent ductus. The pulmonary artery was seen in all but one case, that of a child that accepted only an F 6 catheter, which was too small to permit the aorta to fill rapidly enough to become opaque. In 10 cases the ductus was shown clearly enough to make possible an estimate of its width, and in 6 of these the length of the ductus could also be estimated. In 23 cases a localized dilatation of the aorta at the site of the patent ductus

was seen. This dilatation was thought to represent the infundibulum of the ductus.

Coarctation of the aorta was diagnosed in 41 cases. Surgical proof was obtained in 36 cases, and in 34 cases an end-to-end anastomosis was performed. In 5 cases only postoperative aortography was done. In 18 cases aortography was performed both before and after aortic surgery. As reported in this paper, coarctation of the aorta characteristically showed the portion of the aortic arch posterior to the origin of the left subclavian artery to be relatively short, while the ascending aorta was relatively distended and lengthened. This distal portion of the arch showed four types of deformity: (a) fairly long and wide, 16 cases; (b) fairly long but narrow, 6 cases; (c) short, 11 cases; (d) complete atresia, 3 cases. The distal part of the arch was commonly dislocated forward and directed obliquely downward and forward. Post-stenotic dilatation was present in nearly every instance. One case of constriction of a segment of the descending thoracic aorta and one case with three separate strictures of the distal arch and upper descending thoracic aorta are also reported. In every instance a large collateral circulatory dilatation involved the left subclavian, the internal mammary, and the uppermost intercostal arteries.

One hundred and seventy-two illustrations.

R. F. MCCLURE, M.D.
The Henry Ford Hospital

Aortography with Oxygen as the Contrast Medium. Preliminary Clinical and Experimental Results. A. D'Errico. *Riforma med.* 65: 401, 1951. Abst. in *Radiol. med. (Milan)* 37: 587, July 1951. (In Italian)

Gas embolism is unlikely to follow the intra-arterial injection of oxygen because oxygen is absorbed during its passage through the capillary bed. The author has employed 70 c.c. of oxygen, injecting this amount of gas in the abdominal aorta of several patients, and states that no untoward results have occurred.

CESARE GIANTURCO, M.D.
Urbana, Ill.

Percutaneous Femoral Artery Catheterization in Man with Special Reference to Aortography. E. Converse Peirce, II. *Surg., Gynec. & Obst.* 93: 56-74, July 1951.

The author describes a method of aortography employing a plastic catheter introduced through the femoral artery in a retrograde direction to any point desired along the aorta. At the time of this report the procedure had been carried out 57 times in man. The method is one of direct puncture of the femoral artery with a large-gauge needle through which the plastic catheter is inserted. After the catheter is passed to the desired location in the aorta under fluoroscopic control, 20 to 25 c.c. of 70 per cent diodrast are injected. This gives excellent opacification of the aorta and its major branches.

This method has been used for diagnostic purposes in 22 cases. The remaining femoral artery catheterizations were done for physiologic purposes. The author has demonstrated various lesions of the aorta and its major branches, including aneurysms, occlusion of the aorta and iliac artery, and arteriovenous fistulae. Satisfactory renal arteriograms were also obtained.

The following advantages of percutaneous arterial catheterization are listed: (1) The method appears to be safer than surgical "cut-down" of the artery, as

employed in the past. (2) The equipment required is simple and inexpensive. (3) Only one physician is required for the actual injection. (4) It is possible to delineate any portion of the aorta from origin to termination. (5) Only 20 to 25 c.c. of concentrated diodrast are necessary. (6) Anesthesia is not required. (7) Special tests, such as pulse recordings and direct pressures, can be obtained by leaving the catheter in place. The method also can be used in intra-arterial transfusion.

The principal disadvantage of the procedure is the fact that it requires slightly more skill and is more time-consuming than other types of aortography.

The author has encountered few complications, but possible dangers are enumerated: (1) *Hematomas* formed in about 10 per cent of the cases, but with proper pressure technics during the procedure this complication should be easily avoided. No secondary infections occurred in this series. (2) *Kinking of the catheter during insertion* should be easily avoided by using catheters of good quality and careful technic. (3) *Thrombosis of the femoral artery*, while a potential complication, was not observed in the series reported. Arterial spasm may result in intermittent claudication in arteriosclerotic patients. (4) *Arterial or aortic valve damage* is a potential danger, but 2 cases eventually seen at autopsy showed no evidence pathologically of such injury. Also studies on dogs show no arterial damage from use of catheters. (5) *Arterial rupture or dissection during injection* is a possible complication but was not encountered in this series. (6) *Hypersensitivity reactions to diodrast* occur occasionally and may be severe, though there were no severe reactions in this series. The main caution is to avoid injection of dye in the region of the arteries supplying the cerebral circulation. (7) *Shearing off of the catheter* is a possible danger with inexperienced handling, but has not been reported. (8) *Air embolism* is a potential hazard but with careful technic should be avoided.

Twenty-two roentgenograms; photographs and electrocardiograms.

BRIT B. GAY, JR., M.D.
VA Hospital, Chamblee, Ga.

A Complication Following Coronary Sinus and Cardiac Vein Catheterization in Man. J. McMichael and J. P. D. Mounsey. *Brit. Heart J.* 13: 397-402, July 1951.

Inadvertent coronary sinus and cardiac vein catheterization occurred in 5 patients in an attempt to pass the catheter from the right auricle to the ventricle under fluoroscopic guidance. The position of the catheter as seen in the anteroposterior view appears practically identical with that usually seen when the catheter reaches the outflow tract of the right ventricle, but the left oblique view immediately tells the difference.

The authors recommend fluoroscopy in the left oblique position, at least after the catheter reaches the right auricle, as a precaution against this accident. All the patients had a more or less severe reaction (shock state with gradual recovery over a period of days). In one case it appeared that the catheter perforated the vein and entered the pericardial space, and in several there were electrocardiographic changes consistent with small infarctions. All the patients recovered completely.

Two electrocardiograms; 4 drawings.

ZAC F. ENDRESS, M.D.
Pontiac, Mich.

Calcification of the Aortic Valve and of the Coronary Arteries. David Pyke and Cecil Symons. *Brit. Heart J.* **13**:355-363, July 1951.

To determine the frequency of calcareous aortic stenosis and of calcification elsewhere in the heart, 400 men over sixty years of age were observed fluoroscopically, with spot films where indicated, and 72 hearts obtained at consecutive routine necropsies were examined roentgenographically.

Among the 400 men, 11 cases of aortic valve calcification were found, and in all of these there was clinical evidence of aortic stenosis. [The authors do not state how many (if any) cases were found with clinical signs of aortic stenosis but without calcification.] Fourteen cases of coronary artery calcification were encountered, in patients significantly older than those without coronary calcification. Only one of this number had clinical evidence of coronary insufficiency, and his blood pressure was 270/160. Calcification of the mitral valve was found once and of the pericardium once.

Of the 72 postmortem specimens, 22 showed aortic valve calcification and 38 coronary artery calcification. In both groups the average age was greater than in patients without calcification.

It is believed that the amount of calcium that must be present in the aortic valve for fluoroscopic demonstration varies with the body build. One postmortem roentgenogram is reproduced from a case in which the calcium was not demonstrable during life, and another in which the calcification had been clearly evident fluoroscopically.

It is suggested that calcareous aortic stenosis may be a degenerative disease.

Nine roentgenograms; 3 tables.

ZAC F. ENDRESS, M.D.
Pontiac, Mich.

An Aortic Deformity Simulating Mediastinal Tumor: A Subclinical Form of Coarctation. Carlton R. Souders, Carl M. Pearson, and Herbert D. Adams. *Dis. of Chest* **20**: 35-45, July 1951.

The authors give the histories of 3 cases, in each of which roentgenographic examination revealed a shadow in the superior mediastinum which had the appearance of a soft-tissue mass but proved to represent a congenital anomaly, namely, a double curve or buckling of the aorta. In the first case an exploratory operation revealed the anomaly and also the presence of a patent ductus. In the remaining cases the condition was suspected from the roentgenographic study. Angiocardiology confirmed the diagnosis in the second case, but was inconclusive in the third. The anomaly is regarded as a subclinical coarctation of the aorta in which an external traction or pulling deformity predominates and constriction is minimal. The ribs disclosed no changes.

This type of anomaly is not mentioned by Abbott in her *Atlas of Congenital Cardiac Disease*. Reich (*Diseases of the Aorta*, Macmillan Co., New York, 1949, page 60), however, describes a case discovered in a 40-year-old man on a routine roentgen examination. An angiocardiology revealed "a tortuous, hypoplastic aortic arch forming a superior convexity and below this a 'slight coarctation' of the aorta with aneurysmal dilatation of the descending aorta."

These cases are asymptomatic, and the diagnosis is made roentgenographically. In the postero-anterior projection, in the cases described, the shadow overlay

the aortic arch and varied in diameter from 5.5 to 8.0 cm. Fluoroscopically, pulsations were absent in one case and interpreted as transmitted but not expansible in another. The left anterior oblique view was of the greatest value in demonstrating the character of the lesion, showing the tortuosity of the aorta, resembling a figure "3."

This anomaly must be differentiated from true coarctation and from aneurysm of the ascending aorta or aortic arch and of the left subclavian artery.

Five roentgenograms; 1 drawing; 1 photograph.

HENRY K. TAYLOR, M.D.
New York, N. Y.

Bilateral Superior Venæ Cavæ Accompanied by Patent Ductus Arteriosus. J. W. C. De Groot. *Brit. Heart J.* **13**: 403-405, July 1951.

The author reports a single case of bilateral superior venæ cavæ associated with a patent ductus arteriosus, demonstrated preoperatively by angiocardiology and cardiac catheterization. The left superior vena cava extended downward along the left border of the mediastinum and emptied into the coronary sinus. There was also an arrest in cardiac rotation, with the interauricular and interventricular septa in the mid sagittal plane.

The angiocardiology is reproduced, as well as an explanatory line drawing, but the plain roentgenogram is not shown.

ZAC F. ENDRESS, M.D.
Pontiac, Mich.

Superior Vena Caval Obstruction with Survival After Thirty-Six Years. Arthur S. Glushien and Matthew M. Mansuy. *Angiology* **2**: 210-216, June 1951.

The case is presented of a man who is well and working thirty-six years after the sudden development of high-grade obstruction of the superior vena cava at the age of twenty-three.

Sudden occlusion of the superior vena cava is characterized by marked edema and cyanosis in the upper part of the body, severe dyspnea, and sometimes stupor, convulsions, or loss of consciousness. Between 70 and 85 per cent of cases of obstruction of the superior vena cava are secondary to thoracic neoplasm, and in such cases the prognosis is poor. When the obstruction is due to other causes, the immediate prognosis depends upon the rapidity of development and the completeness of the obstruction, while the ultimate outcome is related to the nature of the underlying disease, the site of obstruction—whether above, below, or at the orifice of the azygos vein—and the development of adequate collateral circulation. In the case reported, the absence of an underlying disease fatal in itself, the localization of the occlusive process above the orifice of the azygos vein, the development of an adequate collateral circulation, and the patient's youth were the factors which permitted such long survival and made possible a life of fairly normal activity.

When diodrast was injected into the right jugular vein, both innominate veins were clearly visualized. The opaque column terminated abruptly at the junction of the innominate veins, and the superior vena cava did not fill. Many dilated venous channels were shown by the reflux of diodrast, the most prominent being the internal mammary veins. Some veins about the right scapula and a dilated intercostal vein in relation to the eleventh left rib could also be seen.

One phlebogram; 1 photograph.

Congenital Pulmonary Stenosis Without Overriding Aorta. A Clinical Study. Y. Larsson, E. Mannheimer, T. Möller, H. Lagerlöf, and L. A. Werkö. *Am. Heart J.* 42: 70-80, July 1951.

The authors designate as "isolated pulmonary stenosis" those types of congenital malformation in which there are signs of pulmonary stenosis without an overriding of the aorta. Absence of a right-to-left shunt as a rule protects the patient from cyanosis and makes possible a normal development without limitation of physical capacity. Since isolated pulmonary stenosis is in general of the infundibular type, even autopsy diagnosis, especially in mild cases, is difficult.

The authors have found it practical to use a physiologic criterion for pulmonary stenosis, namely a higher systolic pressure in the right ventricle, as indicated by intracardiac pressure measurements, than in the main stem of the pulmonary artery. In a study of 218 cases of congenital cardiac malformation by means of cardiac catheterization, they were able to diagnose isolated pulmonary stenosis in 30 cases. The findings in this series are presented in table form.

Eight illustrations, including 2 roentgenograms; 3 tables.

HENRY K. TAYLOR, M.D.
New York, N. Y.

THE DIGESTIVE SYSTEM

Benign Polypoid Tumor of the Esophagus. Andrew F. McBride, Jr. *Cancer* 4: 708-716, July 1951.

In the case of large benign polyp of the esophagus reported here, difficulties in establishing a diagnosis led to errors in management which may fairly be said to have cost the patient his life.

The patient was a 51-year-old male whose chief complaint was a slowly progressive dysphagia. He was given two esophagoscopy examinations and three gastrointestinal radiological series by three different radiologists, with the diagnosis of achalasia of the esophagus. A feature of the case was evidence of severe chronic bleeding of the upper gastro-intestinal tract. A gastrostomy and then a jejunostomy were done because of obstruction, and at exploration polyps were noted in the esophagus. Later a thoracotomy was done and three ulcerated polypoid masses were removed. Symptoms, however, recurred and the patient succumbed. The postmortem findings are described.

In an attempt to elucidate the diagnostic difficulties in cases of this type the author reviews 30 cases from the literature. In these 30 cases there were gross and microscopic findings which are of real importance in the management of these large benign polyps of the esophagus. In the first place all of them were attached by a relatively narrow pedicle, at or near the upper end of the esophagus, usually at the level of the cricoid cartilage. All but one of the cases were examples of a single polyp, the impression of multiplicity being gained because of the bifurcation of the polyp. Surgical removal of many of these polyps is possible by the peroral route.

One roentgenogram; 3 photographs.

DONALD S. CHILDS, JR., M.D.
Rochester, Minn.

Extramucosal Intramural Enteric Cyst of the Esophagus. A Case Report. Bernard D. Rosenak and Helen D. Van Vactor. *Am. J. Roentgenol.* 66: 81-86, July 1951.

A 53-year-old male was first seen because of dull sub-

sternal and epigastric pain of short duration. No previous attacks of this nature had occurred, but there had been an episode of mild dysphagia about three weeks earlier. Oblique roentgenograms of the chest showed a rounded mass located posteriorly in the mediastinum at the level of the 7th and 8th thoracic vertebrae. Radiographic study of the barium-filled esophagus showed it to be compressed anteroposteriorly by a mass arising 3 cm. below the aortic impression and extending downward for about 7 cm. From the appearance of the mucosal pattern and the rather sharp angulation of the lesion superiorly and inferiorly, it was believed to be within the wall of the esophagus but extrinsic to the mucosa.

Approximately four months later the posterior mediastinum was explored. A cyst about 5 cm. in diameter and containing about 1 1/2 ounces of dark mucoid material was excised from the wall of the esophagus. This cyst did not communicate with the lumen of the esophagus and it was not necessary to open the mucous membrane. Microscopic sections of the wall showed it to be an enteric cyst lined by ciliated columnar epithelium. The patient made an uneventful recovery.

Of the benign tumors of the esophagus, leiomyomas, although rare, are encountered with greater frequency than cysts. Only six esophageal cysts were recorded in a review of the literature up to 1943. The enteric cysts may occur anywhere along the gastro-intestinal tract.

The extramucosal benign esophageal tumors may produce no symptoms. When present, these usually are quite mild and do not appear until adulthood. As in the authors' patient, the common complaint is substernal pain, but dysphagia is a rather frequent symptom. The cysts seldom become large enough to produce any appreciable degree of obstruction.

Roentgenographic study of the barium-filled esophagus is the method of study giving the greatest amount of information. The esophagus is usually flattened in one diameter and elongated in the other, giving a slit-like configuration, with stretching of the mucosa over the tumor.

Surgical exploration and excision are usually needed to make a definite diagnosis and are thus the treatment of choice. Prognosis is good.

Four roentgenograms; 1 photomicrograph.

DEAN W. GEHEBER, M.D.
Baton Rouge, La.

Retrograde Extrusion or Prolapse of the Gastric Mucosa into the Esophagus. Maurice Feldman. *Am. J. M. Sc.* 222: 54-60, July 1951.

Retrograde extrusion of the gastric mucosa into the esophagus is a definite clinical and roentgenologic entity. Only one case could be found in a survey of the literature, and in a study of 1,000 adult autopsies not a single instance of the condition was found. The author feels, however, that it exists much more frequently than is apparent and is probably confused with herniation of the stomach through the esophageal opening of the diaphragm. Furthermore, one might not expect to find the condition at autopsy, since the extruded mucosa tends to slide back into the stomach.

Two cases are reported and discussed in which a knuckle of gastric mucosa protruding into the esophagus was demonstrated roentgenographically. In their analysis it is pointed out that several factors might contribute to the changes resulting in retrograde prolapse. They are (1) relaxation of the esophagogastric opening,

(2) excessive redundancy of the gastric mucosa, (3) retrograde peristalsis of the stomach, and (4) repeated regurgitation and excessive or violent vomiting.

Retrograde prolapse of the gastric mucosa must be carefully differentiated from herniation of the stomach through the esophageal opening. An accurate diagnosis can be made only by roentgen study, with fluoroscopy in the prone, prone-oblique, and Trendelenburg positions, and by esophagoscopy.

The following roentgen findings may be observed: (1) shadow of the prolapsed mucosa, shown as a mottled filling defect in the lower esophagus; (2) intermittent retardation of the descent of barium in the lower esophagus; (3) crescent-shaped pressure filling defect at the head of the barium column; (4) obstructive signs, in the presence of spasm or stricture; (5) lumen of the esophageal wall intact and regular, without intrinsic defect; (6) mushroom filling defect or a shelving defect in the column of barium where it meets with the extruded gastric mucosa; (7) retrograde gastric peristalsis; (8) reflux of barium into the esophagus due to cardio-esophageal relaxation; (9) dilatation or bulbar appearance of lower esophagus; (10) ball-valve effect of the extruded gastric mucosa; (11) narrowing of the cardia or fundus of the stomach; (12) puckered or kinked defect in the gastric contour due to tugging of the prolapsed mucosa in extreme cases.

Two roentgenograms; 2 drawings.

FRANK T. MORAN, M.D.
Lancaster, Pa.

Diagnosis of Early Gastric Herniation at the Oesophageal Hiatus. Alan Stewart Johnstone. J. Faculty Radiologists. 3: 52-65, July 1951.

Large gastric herniations through the esophageal hiatus are usually easily recognized. Rigid criteria have to be established, however, if one is to distinguish early herniation, since so often any slight deviation from normal at the esophagogastric junction is likely to be blamed for otherwise unexplained upper abdominal or lower chest pain.

Radiological diagnosis of the condition is hampered by difficulty in localizing the upper margin of the esophageal hiatus and confusion due to two apparent dilatations at the lower end of the normal esophagus, known as the phrenic ampulla and cardiac antrum.

Demonstration of a pouch larger in caliber than the esophagus, lying immediately above the diaphragm at the hiatus, is suggestive of hiatus hernia. The esophagus usually enters the apex of the pouch and is slightly constricted for about 1.0 cm. above this point. If the esophagus enters at the side of the pouch, the diagnostic difficulties are eliminated, for this is pathognomonic of gastric herniation. The definite demonstration of gastric mucosal folds in the pouch is also diagnostic.

The author believes that the surest method of localizing the esophageal hiatus is under fluoroscopy. While swallowing barium, the patient performs the Valsalva maneuver, producing a band of constriction at the lower end of the esophagus 1.5-2 cm. wide. This band is held to represent the position of the hiatus, and any pouch above it, although not above the domes of the diaphragm, must be within the thorax. The normal dilatation, the phrenic ampulla, lies above the hiatus, and the cardiac antrum within the hiatus. The latter may be lined by gastric mucosa but that does not necessarily mean that it is a part of the stomach.

Regurgitation is normally prevented by the pinch-

cock action of the diaphragm and to a lesser extent by the cardiac sphincter. That such a sphincter exists, though there is little anatomical evidence to support it, can be shown radiologically when a small column of barium remains in the esophagus irrespective of respiratory movements of the diaphragm. Regurgitation then is primarily due to a weakness at the esophageal hiatus. The author believes regurgitation to be the most important sign of abnormality; if this is absent, little clinical significance need be attached to a small pouch above the hiatus.

The combination, then, of definite identification of a pouch lying above the esophageal hiatus and free regurgitation of barium, caused either by increasing intra-abdominal pressure or assuming the Trendelenburg position, makes the diagnosis of gastric herniation. In the absence of clear-cut diagnostic features the condition cannot be recognized by radiology alone and esophagoscopy should be performed.

Thirty-three roentgenograms; 11 drawings.

JOHN F. RIESSER, M.D.
The Henry Ford Hospital

Clinical Manifestations and Diagnosis of Lymphosarcoma and Round-Cell Sarcoma of the Stomach. O. Walther. Radiol. clin. 20: 259-268, July 1951. (In German)

Gastric sarcoma is of rare occurrence, accounting for only about 1 per cent of the malignant tumors of the stomach. Three groups are recognized:

(1) *Exogastric Sarcoma*: These tumors originate mostly along the greater curvature or the posterior wall from a rather large base. They grow away from the lumen of the stomach and may cause broad adhesions with adjoining organs. The gastric mucosa may remain intact for a long time. Eventually it may be eroded and severe hemorrhages may occur. The chief roentgenologic sign of this type of tumor is rigidity of the wall of the stomach. Sometimes a fairly large funnel-shaped extension of the barium-filling of the stomach in the direction of the tumor may suggest the diagnosis.

(2) *Endogastric Sarcoma*: Endogastric sarcomata grow into the lumen of the stomach, often from a polyp-like stalk. Differentiation from carcinoma may be difficult or impossible.

(3) *Diffuse Intramural Tumors*: These tumors, like the exogastric group, will produce rigidity of the wall of the stomach.

Histologically, gastric sarcoma is either lymphosarcoma or of the round-cell type, consisting of small, medium-sized, or large cells. The lymphosarcomata are individual localized tumors and not manifestations of a generalized lymphosarcomatosis, as is shown by one of the author's cases, in which resection of the stomach was followed by survival of many years duration.

The analysis of the gastric secretion may be normal, but usually there is hypoauidity. The blood count, as a rule, shows a leukocytosis with a definite diminution in the number of lymphocytes.

In the 6 cases reported here, a cure was obtained only by radical surgery. One patient is alive eighteen years after operation. Protracted fractionated x-ray irradiation has given palliative relief, but no cure. The best treatment, according to the author, is radical surgery followed by irradiation.

Eleven roentgenograms; 1 photograph.

WM. A. MARSHALL, M.D.
Chicago, Ill.

Syphilis of the Stomach. Paul S. Fancher. *Ann. Int. Med.* 35: 240-248, July 1951.

The author reports a case of syphilis of the stomach demonstrating the typical problems of diagnosis and management. The patient was a Negro male seen in 1948, with a history of a chancre in 1942 and a second lesion in 1945. The chief complaints were a sense of fullness and pain in the upper abdomen, vomiting, and weight loss. The Wassermann and Kahn tests were positive. The patient appeared neither acutely nor chronically ill.

The roentgen findings were quite out of proportion to the relatively mild symptoms. The appearance was suggestive of a diffuse infiltrating lesion. Special mucosal studies revealed what was regarded as a polyposis of the lower part of the stomach, while a filling defect near the pylorus was held to indicate a possible malignant process. The gastroscopic observations, showing a serpiginous type of ulceration, were also suggestive of a malignant growth. The patient failed to respond to ordinary management for peptic ulcer but showed serologic and clinical improvement after antisyphilitic therapy, instituted as a preoperative measure and therapeutic test. There was, however, little change in the roentgen and gastroscopic appearance after four and eight weeks of specific treatment, respectively.

Operation was undertaken with the possibility of a malignant lesion still in mind, and a subtotal gastric resection was done. Pathologic examination excluded any neoplastic growth and changes suggestive of syphilis were found, though no spirochetes were present. A report from the Army Institute of Pathology was as follows: "Most of the staff believe the changes to be consistent with but not diagnostic of syphilis. In most instances the diagnosis of syphilis of the stomach is circumstantial since it is difficult to demonstrate spirochetes." Williams and Kimmelstiel (*J. A. M. A.* 115: 578, 1940) are quoted as stating that syphilis is suggested rather than carcinoma when a funnel- or tube-like deformity of the distal portion of the stomach is found in a younger individual, in fairly good clinical condition, with a positive serologic test. The serpiginous nature of the ulceration as found in the case reported has been described by most observers.

Three roentgenograms; 1 photograph; 1 photomicrograph.

STEPHEN N. TAGER, M.D.
Evansville, Ind.

Trichobezoar in Children. Review of the Literature and Report of Two Cases. Sidney Hurwitz and Paul F. McAlenney. *Am. J. Dis. Child.* 81: 753-761, June 1951.

Two cases of trichobezoar, in girls twelve and five and a half years of age, proved at operation, are reported. In the first the diagnosis was suggested by the roentgen findings, and in the second the history suggested the possibility of trichobezoar and roentgenography confirmed the diagnosis.

Seven roentgenograms; 1 photograph.

Small Intestinal Rupture Due to Non-Penetrating Abdominal Injury. Roentgenological Study. George Jacobson and Ray A. Carter. *Am. J. Roentgenol.* 66: 52-64, July 1951.

The authors present 19 cases of rupture of the small intestine due to a non-penetrating injury. Nine of these perforations involved the ileum, 7 the jejunum, and only 3 the duodenum. The important clinical find-

ings were due primarily to bacterial or chemical peritonitis. None of the cases showed symptoms due to hemorrhage, and shock, when present, was attributable to associated injuries.

The radiographic findings depended partially on the site of rupture. Of the cases of duodenal perforation, 1 showed no positive roentgen findings. In another, the right kidney was clearly outlined by retroperitoneal air and a single taut, gas-filled segment of small bowel was seen in the left mid abdomen. In the third case the renal and psoas shadows were obliterated by duodenal contents in the retroperitoneal space. In none of the 3 could free intraperitoneal air be visualized.

Free subphrenic air was present in only 2 of the 7 cases of jejunal perforation. In each of the 2 some evidence of ileus was present. Another of the patients in this group showed paravertebral air in the region of the 10th and 11th thoracic vertebral bodies. Of the remaining 4 patients 1 had no positive roentgen findings, and the other 3 showed minimal ileus changes.

Seven of the 9 patients with perforations in the ileum had films taken in the upright position, and in none of these was free intraperitoneal air recognized. Seven patients presented findings of ileus consisting of minimal scattered collections of small intestinal gas with an occasional distended segment.

The authors emphasize the fact that roentgen examination cannot be relied upon to exclude small bowel perforations following non-penetrating injuries. Another point to be stressed is the minor degree of small intestinal ileus in most of the patients. This was true even in the patients who were not examined until some time after their injury.

Seventeen roentgenograms.

DEAN W. GEHEBER, M.D.
Baton Rouge, La.

Diffuse Familial Polyposis of the Colon. Charles W. Mayo, James H. DeWeerd, and Raymond J. Jackman. *Surg., Gynec. & Obst.* 93: 87-96, July 1951.

Ninety-five cases of diffuse familial polyposis of the colon form the basis of this report. Seventy-three of the patients were between twenty and thirty-nine years of age at the time of diagnosis. The two principal symptoms were blood in the stool and diarrhea; one or both of these were reported in 90 of the 95 cases. The symptoms varied in duration from four months to twenty years or more.

Digital examination of the rectum disclosed a lesion in 63 of 87 cases in which this procedure was satisfactorily performed. Proctosigmoidoscopic study yielded a positive diagnosis in every instance. Roentgen study was carried out in 89 patients, with the following diagnosis: diffuse polypoid lesions of the colon in 75 cases; diffuse polyposis plus carcinoma in 12 cases; carcinoma alone in 2 cases. Thus, as with proctosigmoidoscopy, a positive diagnosis was rendered in every instance in which the examination was carried out. Because of the possibility of malignant change, treatment consists of early radical removal of all of the colon which cannot be visualized with the proctosigmoidoscope, or in selected cases removal of the entire colon. A single-stage subtotal colectomy with end-to-end ileosigmoidostomy, after fulguration of all polyps in the distal 20 to 24 cm. of colon, is the procedure of choice.

Two roentgenograms; 3 photographs; 1 graph.

I. R. BERGER, M.D.
VA Hospital, Chamblee, Ga.

Choledochoduodenal Fistula Following Perforation of Duodenal Ulcer. Treatment by Subtotal Gastrectomy. G. F. Wollgast and W. P. Stampfli. Rocky Mountain M. J. 48: 527-528, July 1951.

Fistulae between the duodenum and biliary tree are more commonly caused by erosion of biliary calculi into the duodenum, though they may be the result of a duodenal ulcer perforating into the common duct, as in the case presented here. Other causes include surgical or other trauma, and rupture of a biliary or hepatic abscess.

The authors' patient, a man of thirty-two years, gave a fourteen-year ulcer history with steady loss of weight for two years and severe pain, fullness, and nausea for six months. He frequently vomited bright red blood. Roentgen examination revealed an obstructing duodenal ulcer communicating with the common duct. A subtotal gastric resection was done because it was feared that the common duct lumen would be narrowed if repair were attempted. Postoperatively the patient was completely relieved of all symptoms.

Two roentgenograms. ZAC F. ENDRESS, M.D.
Pontiac, Mich.

Acute Abdominal Conditions. Roentgen Diagnosis. Leo G. Rieger. Minnesota Med. 34: 650-660, July 1951.

This paper was presented in a symposium before a state medical society. While it was evidently planned with the clinician in mind, the excellent summation of the roentgen signs characteristic of acute abdominal conditions cannot fail to be of interest to the radiologist.

Roentgenograms of the abdomen without contrast media should be made in the supine position and, where possible, in the upright and lateral decubitus positions as well. A simple roentgenogram of the chest, in the supine position, should also be obtained.

Visible Gas in the Gastro-intestinal Tract: Gas is a normal roentgen finding in the stomach, the first part of the duodenum, and the colon; in young children, it occurs normally, also, in the small bowel. Small bowel gas in adults may be seen during manipulative procedures and in periods of emotional stress or severe illness, but in most such cases the diameter of the bowel lumen is within the limits of normal.

Distention of the Gastro-intestinal Tract: Distention of the small bowel to three or four times normal usually indicates obstruction. It may, however, occur as a result of paralytic ileus and infrequently with obstruction of the colon. Generalized distention of both small and large bowel usually signifies paralytic ileus.

Small bowel distention alone is most suggestive of mechanical obstruction. In such a case, the distended loops change position from time to time, the segmentations are apparent, and the loops may arrange themselves in a ladder-like fashion. The upright or decubitus films will show air-fluid levels. Localized distention of one or two loops should arouse suspicion of strangulation. Colon distention alone is most frequently a sign of obstruction.

Fluid Levels in the Bowel: Demonstration of large amounts of intestinal fluid with small amounts of gas may give a lead to closed-loop obstruction. Fixation of one or two loops of bowel may be indicated by fluid levels. Scattered air-fluid levels are seen in peritonitis.

Obliteration of Peritoneal and Visceral Markings: These are mentioned only to be minimized in importance.

Hydroperitoneum: Fluid appears in the abdominal cavity in many instances of acute disease, manifesting itself by separating the loops of intestine. Normally, between each pair of loops there is a fine white line representing the thickness of the two bowel walls in contact. When fluid is present, this line becomes much wider and at points where three loops are in contact the shape of the area of separation becomes that of a triangle or circle rather than a three-pronged stellate shadow.

Pneumoperitoneum and Hydro-pneumoperitoneum: Free gas in the peritoneal cavity is clearly abnormal. The erect and decubitus positions are most helpful in demonstrating air when present. When it occurs in large amounts, the air outside a hollow viscus may contrast with intraluminal gas with great clarity, the bowel wall forming the boundary between the two.

Free air may be present for at least three weeks following abdominal surgery. It may be due to the presence of gas-forming bacteria in the peritoneal cavity or may indicate rupture of some portion of the alimentary tract or of the bladder if air has been introduced into it artificially. Free air is to be distinguished from interposition of bowel between liver and diaphragm, and from gas accumulated in subphrenic abscess. Eighty per cent of cases of perforation of the stomach or duodenum will show pneumoperitoneum.

Air and fluid within the peritoneal cavity form a characteristic pattern to be distinguished from subphrenic or intraperitoneal abscesses.

Localized Collections of Gas, Fluid or Fluid and Gas: Air in the distribution of the biliary tree is usually significant in that it points to internal or biliary fistula and in some cases may suggest gallstone obstruction. Fixed bubble-like collections of gas may point to intraperitoneal abscess.

Localized pockets of fluid outside the bowel usually signify an abscess. If air is present, in most cases it represents a connection with the bowel lumen. Retrocecal and perinephric abscesses are at times seen in the form of bubble-like or stripe-like shadows.

Displacement of Viscera: The stomach or bowel may show displacement by abscesses or by fluid collections, such as blood or urine. Hematoma of the spleen or liver may cause downward displacement of the stomach or hepatic flexure of the colon.

Displacement and Immobilization of the Diaphragm: Increased abdominal pressure usually produces elevation of the diaphragm. This upward displacement when produced by intraperitoneal hemorrhage or other fluids is most clearly shown in the supine position. Fixation of the diaphragm, best demonstrated fluoroscopically, is seen in association with many intraperitoneal lesions, especially acute inflammatory states.

Extravasation of Contrast Substances: The introduction of contrast media, such as barium sulfate, into the gastro-intestinal tract may permit actual observation of the point of perforation of an ulcer or carcinoma by extravasation of the material into the peritoneum. This procedure is, however, harmful and should be avoided in cases with suspected intestinal perforation. Intravenous pyelography may, on the other hand, be of considerable aid in determining the presence of rupture of the kidney, ureter, or bladder. Air cystography may be helpful in delineating rupture of the urinary bladder.

The following specific conditions, manifested by the signs described above, are discussed in some detail: strangulation obstruction, acute intussusception, gall-

stone obstruction, acute obstruction of the colon, volvulus of the colon, general peritonitis, intraperitoneal abscess, and perforation of a hollow viscus.

Two tables.

I. R. BERGER, M.D.

VA Hospital, Chamblee, Ga.

THE MUSCULOSKELETAL SYSTEM

Radiology in Bone Pathology. Joseph Hanelin and Laurence L. Robbins. *New England J. Med.* **245**: 20-27, July 5; 60-66, July 12, 1951.

This paper surveys the literature which has appeared in the field of osseous radiology since a report by Mallory in 1942. New clinical entities are considered, and emphasis is placed on those articles which correlate radiological findings with pathological changes.

Pediatrics: The work of Todd and others in the field of the normal rate of skeletal development has been valuable in filling this deficient segment of pediatric radiology. The use of serial radiographs of the radius in the diagnosis and management of myxedema is also mentioned.

Newer conditions added to the literature include hypophosphatasia, an anomaly of bone development associated with an absence of alkaline serum phosphatase, apparently due to a primary failure of the osteoblasts to produce alkaline phosphatase; a new congenital syndrome consisting of prenatal bowing and thickening of the tubular bones associated with multiple cutaneous dimples in the arms and legs, which would seem to be attributable to mechanical intrauterine pressure; diastematomyelia, a developmental defect involving sagittal division of a segment of the cord or cauda equina. In this last anomaly the cord is transfixed by an osseous or fibrocartilaginous septum extending from the vertebral body posteriorly to the dura. This midline osseous spicule may be seen radiographically along with widening of the neural canal. Myelography is sometimes necessary for diagnosis of the midline defect.

Dysplasia epiphysealis punctata or chondrodystrophia calcificans congenita is a rare disease characterized by multiple centers of increased density in the epiphyses. The spotted epiphyses appear at an earlier age than the normal ossification centers, are enlarged, and are usually associated with limitation of motion. Another rare syndrome mentioned is characterized by progressive symmetrical fusiform enlargement of the diaphysis, retardation in growth, and muscular weakness. This entity must be differentiated from Paget's disease of bone.

In 1945 the findings in infantile cortical hyperostosis were first described. Since that date a total of 32 cases have been reported in the literature. This syndrome is manifest by multiple painful soft-tissue swellings with hyperostosis in the adjacent bones. The etiology is unknown and the process usually begins to diminish after several months.

Mention is also made of a correlation between chronic subdural hematoma and multiple fractures in the long bones, of a study of double-contour shadows of the long bones in infants, and of the occurrence of pseudohypoparathyroidism, resulting from an inability to respond to the parathyroid hormone rather than to a lack of this substance and believed to be related to dyschondroplasia.

Osteomyelitis: Although roentgen changes in bone are not demonstrable until ten to fourteen days after

the onset of an acute osteomyelitis, changes in the overlying soft tissues may be demonstrated radiographically within twenty-four hours. These earliest findings may consist of loss of intermuscular planes and loss of the fat shadows beneath the subfascial planes. Acute fulminating osteomyelitis is becoming a disease of the past due to the extensive use of antibiotics early in its course. In those cases in which treatment is started within three days of the onset, only minimal or perhaps no bone changes are found.

Acute osteomyelitis may occur in the newborn, usually as part of a septicemia. The hip joint is the commonly involved area and radiographically the process must be distinguished from congenital dislocation. Osteomyelitis in infants also not uncommonly follows marrow infusions.

The various causes of chronic osteomyelitis are mentioned as they have been recorded in the literature. The radiographic appearances have not altered from the descriptions in the older reports.

Benign Tumors: The need for differentiating the malignant from the benign type of giant-cell tumor (osteoclastoma) has been stressed. Differences of opinion as to classification, theoretical etiology, and methods of treatment, as well as the dangers and values of biopsy, have been expressed. Aggressive or malignant characteristics are found more frequently in the so-called variants, which have little in common with the true giant-cell tumors. Benign chondroblastomas and aneurysmal bone cysts have a radiographic appearance similar to that of giant-cell tumor, as does chondromyxoid fibroma of bone. The latter, although it is believed to be a benign lesion, is difficult to distinguish from chondrosarcoma or fibrosarcoma.

Osteoid osteoma has been described both as a benign tumor and as a form of chronic sclerosing osteomyelitis. The characteristic radiographic finding is a dense central nidus surrounded by an area of rarefaction that is itself surrounded by sclerotic bone. At times the nidus may lose its sclerotic radiographic appearance.

Malignant Tumors: Among 565 cases of Ewing's tumor collected from previous reports a five-year survival rate of 9 per cent was found. One case of fourteen-year survival is mentioned, with eventual death due to metastatic disease. Radiation therapy is the treatment of choice in most cases.

Osteogenic sarcoma, fibrosarcoma, and chondrosarcoma are sometimes classed together as one group for follow-up purposes. However, fibrosarcoma and chondrosarcoma metastasize at a later stage of the disease than does true osteogenic sarcoma. Differences in the clinical and radiographic appearance of the three also occur.

Abnormally situated cartilage deposits, such as enchondroma and osteochondroma, are potentially malignant and should be excised if possible. Any change in the appearance of the apparently benign lesion should always arouse suspicion. Malignant change in Paget's disease is not uncommon; when it does occur, the prognosis is quite poor.

Reticulum-cell sarcoma of bone is a rather recent entity, as it has not formerly been considered as an isolated bone lesion. The tumor usually is found in a long bone as an area of destruction with perhaps minimal productive changes. The cortex is destroyed in a rather patchy fashion with no evidence of expansion. The lesion grows rapidly if untreated but shows a good response to radiation therapy.

The fact that multiple myeloma occurs in childhood is pointed out. The solitary myeloma is discussed, and it is noted that it will probably be found to become multiple if followed for a sufficient length of time. Most cases of myeloma do not respond satisfactorily to irradiation.

Miscellaneous Bone Lesions: Among miscellaneous bone lesions which have been the subject of reports are fibro-osteoma, ossifying fibroma, and leontiasis ossea, all probably varying manifestations of fibrous dysplasia of bone; osseous changes in sickle-cell anemia and myeloid metaplasia; eosinophilic granuloma, which appears to be closely related to Hand-Schüller-Christian and Letterer-Siwe's disease; osteitis pubis, calcified medullary defects, and hyperparathyroidism.

The subject of hypertrophic pulmonary osteoarthropathy is discussed. Its association with heart disease and pulmonary lesions is well known. An idiopathic type is also mentioned. This process is often slowly progressive to rather extreme deformity and disability. Bone formation and calcification within the soft tissues are included, since they are closely related to bone disease. The differentiation between villonodular synovitis and synovial sarcoma is mentioned.

Bone Changes Due to Therapy: Vitamin A is necessary for the normal function of the epiphyseal cartilage cells, but its excessive administration may lead to abnormalities of growth and epiphyseal closure. The more frequently encountered radiographic evidences of hypervitaminosis A are periosteal proliferations.

Reports of excessive doses of Vitamin D with soft-tissue calcification, bone or joint abnormalities, and renal failure are appearing with increasing frequency. A point to be stressed is that the renal complications may be fatal. The soft-tissue calcifications occur during the periods of decline of the serum calcium.

Both castration and estrogen therapy have been used with favorable palliative results in advanced prostatic carcinoma. Frequently the osseous lesions will become even denser for a few months, and then perhaps revert in the direction of normal bone. Almost invariably, however, the symptomatic relief is greater than the bone changes.

Following hormonal treatment of carcinoma of the breast some histologically studied cases have shown varying phases of degeneration of the malignant cells. Bone pain may diminish in only a few days, even though there may be no radiographic changes for several months.

Some of the radioactive isotopes have been used in the treatment of metastatic carcinoma. In some instances soft-tissue lesions and lytic bone changes of thyroid cancer regressed following administration of radioactive iodine.

Only minimal improvement in the bone lesions in Hodgkin's disease has been reported with nitrogen mustard therapy. Urethane has been of benefit in some cases of multiple myeloma. Aminopterin has been reported as producing palliation in leukemia in children.

Effect on Bone of Radiation Therapy: Supervoltage radiation was shown to produce less radiation osteitis than does 200-kv. therapy. Other forms of irradiation may also produce bone changes. Destruction of the epiphysis and subperiosteal new bone formation followed diathermy burns in two infants. Frostbite may also produce epiphyseal arrest.

Necrosis of bone following intensive irradiation therapy is often difficult to distinguish from neoplasm.

More cases of sarcoma developing in irradiated bone have been reported. Radiation osteitis may appear within a rib several years after irradiation for carcinoma of the breast.

Improvements in Diagnostic Methods: The greater advances in technical methods are those dealing with opacification of blood vessels and the use of radioactive isotopes. The pattern of vascularity has offered a new diagnostic method in the study of neoplasms. For example, in malignant tumors new blood vessel formation may be noted, whereas in osteomyelitis there are no new vessels. Radioactive isotopes may be used in detecting aseptic necrosis of bone by determining if certain bone fragments pick up the radioactive material.

Radiographic means of determining mineral content of bone have been employed by comparing absorption of radiation in a bone with that in a phantom placed over the bone. This method has been used in evaluating the severity of rheumatoid arthritis of the phalanges. Several methods of accurately measuring bone length are also mentioned. The recent advances in arthrography with contrast material are briefly discussed.

The authors feel that the greatest steps forward in the next ten years will be in better classification of lesions and in better correlation of roentgenographic and pathological findings. DEAN W. GEHEBER, M.D.
Baton Rouge, La.

Multiple Spontaneous "Pseudo-fractures" of Bone (Milkman's Syndrome). Stanley Nowell, P. R. C. Evans, and F. Kurrein. *Brit. M. J.* 2: 91-94, July 14, 1951.

A brief review of the literature on so-called "pseudo-fractures" is presented and 3 cases are reported.

Since the initial diagnosis of this condition usually rests on the radiological discovery of the "pseudo-fractures," the authors emphasize the necessity of a careful roentgen study of the bones of any patient presenting a history of pain and weakness for months, or even years, in the extremities, pelvis, or chest wall.

The syndrome appears to be a manifestation of osteomalacia (or its juvenile equivalent, rickets), since the histopathology and biochemical findings are similar to those of osteomalacia, with improvement or cure following vitamin-D therapy. The syndrome is most common in the fifth to eighth decades of life and much more frequent in women. The fractures are usually multiple and in the typical case the lesions are seen in varying stages of development. The characteristic roentgenological appearance consists of a radiolucent band extending across the bone, wiping out the normal osseous pattern. There is usually a well defined condensation of bone just above and below this area. Healing following fixation and vitamin-D therapy occurs slowly, sometimes taking two to three years. Five roentgenograms.

R. W. DICKENHORST, M.D.
Shreveport (La.) Charity Hospital

Engelmann's Disease (Progressive Diaphyseal Hyperostosis). Report of a Case. William H. Gullledge and J. Warren White. *J. Bone & Joint Surg.* 33-A: 793-797, July 1951.

The authors report a typical case of Engelmann's disease and suggest the term "progressive diaphyseal hyperostosis" as a more fitting name for this syndrome. They state that 9 cases have been previously reported in the literature, and to these they add a tenth.

The clinical and roentgen findings in all the cases are similar, consisting of fusiform expansion and hyperostosis of the diaphyses of the long bones, together with malnutrition and underdevelopment.

The case reported here is that of a 9-year-old Filipino boy with involvement of all the long bones and petrous portions of the temporal bones. There were no significant laboratory findings.

Six roentgenograms; 2 photographs; 1 photomicrograph.
JOE B. SCRUGGS, JR., M.D.
University of Arkansas

Fibrous Dysplasia of Bone and Comparable Conditions in the Jaws. Frank L. Ingram. *Proc. Roy. Soc. Med.* 44: 549-556, July 1951.

When one of the jaws is the site of fibrous dysplasia, in the great majority of cases the lesion appears to be monostotic, though it is possible that there are changes in other bones too slight to be noticed. The typical lesion in the maxilla is quite different radiologically from the partially cyst-like lesion which occurs in long bones. There is enlargement of part of one side of the jaw, and the bone pattern is much finer than that of normal alveolar bone. The jaw is denser to x-rays, partly because it is thickened and partly because of the change in pattern, with finer trabeculae and smaller spaces between them. The margins of the lesions are indistinct, with a slow transition to normal bone, but occasionally the median maxillary suture appears sharply to limit the lesion.

The author presents a series of 25 roentgenograms with comments on the cases illustrated. These include a number of other conditions than fibrous dysplasia, for purposes of comparison. Paget's disease, which has been said to show some similarity to fibrous dysplasia, is represented by several cases.

Chronic Hypertrophic Spondylosis of the Cervical Spine with Compression of the Spinal Cord and Nerve Roots. Joseph A. Epstein and Leo M. Davidoff. *Surg., Gynec. & Obst.* 93: 27-38, July 1951.

Hypertrophic changes in the cervical vertebrae are observed frequently. When these changes are extensive enough to compress neural structures, a syndrome results which possesses many clinical features in common with chronic degenerative diseases of the spinal cord, such as primary lateral sclerosis, amyotrophic sclerosis, and multiple sclerosis. There is an abundance of evidence that disease of the intervertebral disk is a natural precursor of the changes in the vertebrae which we recognize as hypertrophic spondylitis. The gradual aging of the disk is characterized by dehydration of the more fluid nucleus and escape of the nuclear material through fissures in the cartilage plate. With the approach of the middle decades, the fibrous lamellae of the annulus fibrosus become more definite and larger. As these changes progress, the disk becomes thinner and the trauma of living must be borne in greater part by the annulus fibrosus, resulting in a strain upon the vertebral bodies with consequent sclerosis, lipping, and spur formation.

The authors' material consists of a group of 6 patients in whom severe spondylosis of the cervical spine resulted in a neurological syndrome of combined radicular and spinal cord involvement.

The patients varied in age from fifty-two to sixty-nine years. The initial complaints were referable to

the lower extremities in 5 of the 6 patients, consisting of a gradual onset of unsteadiness of gait with spasticity and weakness. Numbness, burning, and shooting pains were frequent. In 5 cases the upper extremities were affected, with weakness, stiffness, and numbness of the fingers. The course was progressive in all; in 5 patients all four extremities were ultimately involved.

Roentgenograms showed advanced spondylosis in all cases and in 2 instances bony projections from the posterior borders of the spinal canal were present. Abnormal curvature was noted in only one instance.

Cervical myelograms disclosed a series of one or more horizontal defects at the level of the intervertebral spaces, involving parts or the whole of the axillary pouches. In one case, the posterior ridging was severe enough to produce a block to the passage of oil.

Operation confirmed the presence in all patients of firm, bony hard ridges indenting and displacing the spinal cord posteriorly. The nerve roots were observed to be stretched across these ridges. Decompression of the cord was done. Improvement was obtained in two cases.

Since plain roentgenograms may not be sufficient to establish a diagnosis in cases of this type, myelography is mandatory. It is of the utmost importance to make exposures with the patient in the lateral recumbent position with the side of greatest involvement dependent. Six cubic centimeters of pantopaque has been found to be sufficient in most cases. The procedure consists of tilting the patient with the neck hyperextended until the oil collects in the cervical canal, after which the table is placed in the horizontal position and the patient is turned on his side, care being taken to keep the head tilted slightly upward so as to prevent oil from draining into the cisterna magna. This has been found to be the most effective way of demonstrating the true extent of the anterior and anterolateral indentation of the spinal canal in the multisegmental manner characteristic of this lesion.

Six roentgenograms. I. R. BERGER, M.D.
VA Hospital, Chamblee, Ga.

Bow Elbow (Cubitus Varus). Don King and Charles Secor. *J. Bone & Joint Surg.* 33-A: 572-576, July 1951.

The authors point out that the deformity cubitus varus ("bow-elbow"), consisting in an inward inclination of the supinated forearm on the extended elbow, although not uncommon, has not been discussed at any great length in the literature. They have themselves treated 15 patients with this abnormality. In all of these the cause was an unreduced medial tilt of the short distal fragment in a supracondylar fracture of the humerus.

Prior to surgical correction, anteroposterior roentgenograms of both upper extremities are made, and the degree of deformity, the normal carrying angle, and the amount of correction necessary are determined. On this basis the width of the osteotomy opening is determined. The operative technic and the postoperative care are described.

These 15 cases were corrected with excellent results. There were no permanent complications and no recurrences.

Seven roentgenograms; 2 drawings; 1 photograph.
JOE B. SCRUGGS, JR., M.D.
University of Arkansas

Triphalangeal Thumb. Henry Milch. J. Bone & Joint Surg. 33-A: 692-697, July 1951.

Because triphalangism of the thumb is apparently "exceedingly uncommon" and the references in the literature are correspondingly few, the extra phalanx has sometimes been called an exostosis and more commonly an "accessory ossicle."

Several different theories have been advanced to explain this anomaly. According to one, the extra phalanx would normally be assimilated by the distal phalanx, and its presence therefore represents an arrest in development. A more acceptable view is that the extra phalanx is the remnant of the base of one of the two nail phalanges of a bifid thumb.

Surgery is contraindicated in the adult, but the deformities in children, particularly in early childhood, should be corrected surgically, with removal of the extra ossicle.

Four case reports with 11 roentgenograms.

JOE B. SCRUGGS, JR., M.D.
University of Arkansas

Eosinophilic Granuloma of Rib. David R. Weir. Ann. Int. Med. 35: 233-236, July 1951.

Clinically and radiographically, eosinophilic granuloma may simulate a wide variety of bone diseases, ranging from simple cyst to apparent malignant bone destruction. A case of the latter type is reported.

The patient was a 38-year-old white man who in June 1948 began to have attacks of moderately severe right-sided chest pain. Nine weeks after the onset of the pain, radiographic studies demonstrated an area of osteolysis measuring about 6 cm. in length in the posterior arc of the right fifth rib. There was evidence of a pathologic fracture and some attempt at healing. Films of the remaining ribs, skull, spine, and pelvis failed to reveal other lesions. Three examinations for Bence-Jones protein were negative. Aspirated sternal marrow showed a normal myeloid-erythroid content and a normal nucleated cell count. The marrow differential count was also normal.

Because of the "alarming roentgen-ray appearance," resection of the rib was done. The pathologic diagnosis was eosinophilic granuloma with osteogenesis consistent with healing fracture. Eight months after operation the patient was symptom-free, and physical examination and laboratory findings were normal.

Excision, if it can be carried out, is the treatment of choice for eosinophilic granuloma. Lesions that cannot be excised may be treated by curettage or roentgen therapy, or both. At present no evidence exists in the literature to indicate that solitary lesions recur. A more generalized form of the disease involves lymph nodes, the reticulo-endothelial system, and bone, showing a similarity, morphologically, to Letterer-Siwe's disease and Hand-Schüller-Christian's disease.

One roentgenogram; 1 photograph.

STEPHEN N. TAGER, M.D.
Evansville, Ind.

Traumatic Dislocation of the Hip. A Survey of Two Hundred and Four Cases Covering a Period of Twenty-one Years. Vernon P. Thompson and Herman C. Epstein. J. Bone & Joint Surg. 33-A: 746-777, July 1951.

The authors report a study of 204 patients with dislocation of the hip seen between July 1928 and July

1949. One-fourth of all the dislocations occurred in females and nearly two-thirds of the patients were between the ages of sixteen and forty years. In the final analysis of the series, 88 cases were excluded because the results could not be properly ascertained or because the patient had been followed for less than a year.

The dislocations were divided into anterior and posterior groups, with the latter subdivided into five types: with or without minor fracture; with large single fracture of the posterior acetabular rim; with comminuted fracture of the rim of the acetabulum, with or without a major fragment; with fracture of the acetabular rim and floor; with fracture of the femoral head. The results were judged independently by roentgenographic and clinical methods. Of the 104 cases which were evaluated by both methods, there was complete agreement in 80.

A very complete statistical analysis of the results was made and is here demonstrated by graphs and tables. The results are evaluated in relation to the type of dislocation, the type of reduction (open or closed), time elapsed before reduction, and interval before full weight-bearing was allowed.

Avascular necrosis and traumatic arthritis were the chief complications. Good management depends upon prompt recognition of the dislocation and, when conditions permit, early institution of treatment.

Thirty-seven roentgenograms, 1 graph; 18 tables.

JOE B. SCRUGGS, JR., M.D.
University of Arkansas

THE BLOOD VESSELS

Rapid Serial Contrast Angiography. Charles T. Dotter and Israel Steinberg. With the technical assistance of Doris C. Smith. Angiology 2: 173-183, June 1951.

The authors describe in a general way the application of the Fairchild roll-film unit to angiocardiology, cerebral angiography, peripheral arteriography, and abdominal aortography. An earlier description of the apparatus appeared in the *American Journal of Roentgenology* (Dotter, Steinberg, and Temple: Am. J. Roentgenol. 62: 355, 1949. Abst. in Radiology 55: 310, 1950).

Fourteen roentgenograms; 2 photographs.

Translumbar Aortography: Its Value in Diagnosis, Management and Prognosis of Renal Pathology. Watterson Reagan. J. Arkansas M. Soc. 48: 53-54, July 1951.

In a paper read before the Annual Meeting of the Arkansas Medical Society, the author gives a brief description of the technic of aortography, emphasizing the importance of attention to detail and listing the renal conditions in which aortography may be employed to advantage. In a series of 49 aortographic examinations, the postoperative course was uneventful in all.

Technic and Evaluation of Venography of the Extremities. Alex. Dimtza. Radiol. clin. 20: 198-217, July 1951. (In German)

For demonstration of the veins of the extremities, the author has taken up the method first described by Drasnar (Schweiz. med. Wchnschr. 76: 36, 1946) and Jenny (Schweiz. med. Wchnschr. 77: 1195, 1947), consisting of injection of contrast medium into the bone

marrow. The great advantage of this procedure is that the veins are filled equally in a natural way and that the deep veins are particularly well demonstrated. For the visualization of the veins of the lower leg the dye is injected into the bone marrow of the outer malleolus and during fluoroscopic observation films are taken with a spot radiographic device. Thus a film of the venous system may be obtained during its maximal filling. If certain sections of the system are not properly filled, active contraction or massage of the musculature can give further information about the area in question, the valves can be carefully studied, and a very complete filling of the venous system is obtained. During manipulation and rotation of the leg spastic conditions can be differentiated from true occlusions. The dye is not retained in the bone marrow. The patients are ambulatory and leave the x-ray department immediately after the examination.

There are two disadvantages to the method: Pain during the injection and occasional reflux of the contrast medium into the subcutaneous tissue leading to a painful swelling and to some temperature elevation. The pain of injection can usually be avoided by the use of novocain (see below), while reflux can usually be prevented by inserting the needle with one thrust without any sideward movement. If it is found during the fluoroscopic examination that some of the contrast medium has escaped along the side of the needle, it is better to interrupt the procedure and start again on the other malleolus.

The technic is as follows: A tourniquet is applied to the leg below the inguinal canal. The skin over the outer malleolus is anesthetized with a little novocain (without adrenalin!). The sternal puncture needle is then forced into the bone marrow of the outer malleolus. Its proper position is checked fluoroscopically. Two c.c. of a 1 per cent novocain solution (without adrenalin!) is first injected, followed by 20 c.c. of the contrast medium, under fluoroscopic control. The writer uses "Savac," a preparation containing about 30 per cent of iodine. [In the commercial section of the same journal this dye is advertised as a medium for intravenous pyelography. Our American products (Diodrast, etc.) might, therefore, be just as satisfactory.—W.A.M.] The spot radiographic films are made with a device which permits the use of a 36 × 36-cm. cassette, on which two exposures usually are made. If larger films are desired, they can be made later with the regular radiographic equipment, after another injection of 20 c.c. of the medium. Amounts of dye up to 100 c.c. have been well tolerated.

For the visualization of the veins of the upper extremity, the injection is made into the medial surface of the lower end of the radius. For the visualization of the pelvic veins, the injection is made into the major trochanter of the side involved or, if necessary, on both sides. Excellent visualization of the veins of the pelvis is obtained.

Nine roentgenograms; 2 photographs.

WM. A. MARSHALL, M.D.
Chicago, Ill.

Phlebography of the Leg in the Erect Position. H. William Scott, Jr., and John F. Roach. *Ann. Surg.* 134: 104-109, July 1951.

In order to plan appropriate surgical therapy in late post-thrombotic sequelae, information is needed concerning patency and competency of valves in the deep,

communicating and superficial venous systems of the extremity.

The authors describe a procedure in which the radiographic table is elevated to an angle of 75 degrees and the patient stands on the footrest with the leg in the midline of the table top. A 14 × 17-inch cassette is placed in the film tray beneath the Potter-Bucky diaphragm and positioned so that approximately 6 inches of the lower end of the femur are included. The roentgen tube is fixed at a distance of 36 inches from the table top and centered to the film but displaced laterally 1 1/2 inches from the vertical midline. A tourniquet is placed just above the ankle, sufficiently tight to obstruct the superficial venous system, and 20 c.c. of 30 per cent diodrast are injected into the dorsum of the foot. The first radiographic exposure is made on completion of the injection. A new film cassette is then put in the film tray, the tube is shifted laterally 3 inches so that it lies 1 1/2 inches to the opposite side of the midline, and a second exposure is made.

By use of this method the anterior tibial, posterior tibial, peroneal, and popliteal veins and valves are clearly delineated. The physiologic elevation of venous pressure and reduction in rate of venous flow in the lower extremity which accompany the erect position are the factors responsible for the improved phlebographic demonstration of valvular function.

Four phlebograms; 1 drawing; 1 photograph.

THOMAS S. LONG, M.D.
University of Louisville

Deep Venous Valves in the Aetiology of Varicose Veins. H. D. Moore. *Lancet* 2: 7-10, July 7, 1951.

One hundred and two legs of 63 patients attending the varicose-veins clinic at the Radcliffe Infirmary, Oxford, England, were studied venographically, by the technic described by the author in 1949 (*Brit. J. Surg.* 37: 78, 1949. *Abst. in Radiology* 54: 915, 1950). In 84 instances there was no history of thrombosis. A large number of the patients without thrombosis did suffer from severe complications associated with varicose veins. Of 12 patients with ulcers but no varicose veins clinically, 11 were found to have large superficial varicosities on venography.

In the 84 legs in which there was no history of deep venous thrombosis, the findings were as follows: (1) Fifty-seven legs showed no valves in the deep veins, while 27 legs showed apparently adequate valves. (2) The outline of the deep vessels was normal, i.e., regular and smooth. (3) When valves were absent, the deep vessels were larger than normal. (4) Where there were symptoms (varicose veins, induration, or ulcers), the connections between superficial and deep veins were always striking. Sometimes there were several large connections, but more often there were multiple small ones from the muscular veins. The tendency for the medium (pyelosil) to fill the superficial rather than the deep veins was also striking. (5) The superficial veins could show good valves, while the deep veins were dilated and showed none.

In the 18 legs with a history of (or suggestive of) deep venous thrombosis, the venographic findings were as follows: (1) None of the legs showed valves. (2) Six legs showed irregular uneven outline and filling of the deep veins, and the vessels were small. (3) Twelve legs showed deep veins with regular smooth outlines, and these vessels were larger than normal. In other words, they were very similar to the valveless vessels of the

non-thrombotic group. (4) The connections between superficial and deep veins were striking, and similar to the non-thrombotic group. (5) One femoral vein was still thrombosed, but in none were all the deep veins occluded; even in a recent severe phlebothrombosis the blood found its way around the clot.

The author concludes that patients with varicose veins and their complications who have never had deep thrombosis can be divided into two groups, similar in age and in the appearance of their legs but different in the state of their deep veins: (1) those with normal valves in the deep veins, and in whom the deep veins are usually of normal size, in whom it is reasonable to suppose that all symptoms arise from the abnormal condition of the superficial vessels; (2) those with no visible valves in their deep veins, and in whom the deep veins appear larger than normal, in whom there seem to be comparable and equal conditions in the superficial and deep venous systems. The fact that there can be normal valves in some of the superficial veins when there are none in the deep veins suggests that the deep valvular insufficiency may precede the superficial.

Patients with varicose veins or ulcers who have had deep venous thrombosis form a single functional group, in that none have visible valves in the deep veins. They can, however, be divided into two venographic groups: those with small irregular vessels, resulting from thrombosis and recanalization, and those with vessels which are larger than normal and with a smooth outline, suggesting that the veins seen have not been thrombosed but have dilated after an ilial thrombosis or a thrombosis of one group only of the leg veins.

All patients with varicose veins, whether they have had deep venous thrombosis or not, can be divided into two groups: (1) those in whom the superficial veins alone seem to be abnormal (25 per cent of those studied) and (2) those in whom both superficial and deep veins are abnormal and without visible valves. In this latter group the venographic appearance of non-thrombotic legs is essentially similar to two-thirds of the thrombotic legs. In the first group, adequate ligation should produce a cure. In the second group, operation on the superficial veins alone seems bound to fail, for not only does it seem impossible to obliterate all the superficial veins and their connections with the deep veins, but the root of the problem is not touched—the abnormal deep veins.

Seventeen venograms.

Clinical Diagnosis of Arteriosclerosis in the Aged, with Particular Reference to Interpretation of Roentgen Findings. Frederic D. Zeman and Max Schenk. *Am. J. Roentgenol.* 66: 73-80, July 1951.

The authors feel that the inclusive diagnosis of "general arteriosclerosis" should no longer be used, but that one should, so far as possible, designate the specific artery or arteriole involved. They also point out the fact that involvement of a blood vessel by calcification should not necessarily lead to the conclusion that it is the cause of a patient's functional changes.

Five cases are presented, showing calcification in various vascular structures. One patient had a generalized dense blood vessel calcification with good functional capacity. Another had a calcified abdominal aneurysm. The sites of calcification in the remaining patients were the left coronary artery, mitral valve, and internal carotid artery.

As part of this study of arteriosclerosis, 200 routine

chest films were examined. In only 19 (or 9.5 per cent) cases was the thoracic aorta entirely normal. In the others it showed elongation, widening, and calcification in different combinations. A correlation between arteriosclerotic lesions and the blood pressure is mentioned.

It is felt that roentgen studies of the heart in older patients aid materially in establishing the diagnosis of aortic stenosis, in clarifying the pathogenesis of heart block, and at times in visualizing the coronary arteries, myocardial infarctions, and cardiac aneurysms. In the future, therefore, careful cardiovascular studies of aged individuals should include painstaking roentgenoscopy of the heart as well as roentgenograms of the head, the chest, the abdomen and the extremities to demonstrate calcification and other alterations of the major arterial trunks.

Eight roentgenograms.

DEAN W. GEHEBER, M.D.
Baton Rouge, La.

Portal Circulation in Experimental Hemorrhagic Shock. In Vivo Roentgen Ray Studies. Edward W. Friedman, Howard A. Frank, and Jacob Fine. *Ann. Surg.* 134: 70-79, July 1951.

In this study, dogs were prepared for portal vein visualization by splenectomy and subcutaneous implantation of the ligated splenic vein. Later, the portal vein was catheterized through the splenic vein and thorotrast was injected. The left hepatic venous bed was visualized by injection through a catheter passed under fluoroscopic control through the right jugular vein and inferior vena cava into the left hepatic vein.

Normal animals showed no change in vessel caliber or in portal or arterial pressure following injections of thorotrast. Roentgenograms clearly outlined the portal vein and its branches, demonstrating the separate portal supply to each of the six lobes, with the vessels terminating in end-veins. Satisfactory films of the hepatic vein were also obtained, although this procedure was technically more difficult.

Hemorrhagic shock was produced by bleeding from a large artery exposed under local anesthesia to an arterial pressure of 30 mm. Hg maintained for two to four hours. Roentgen observations were carried out before bleeding, during hypotension, at various times following blood replacement, and in several instances after subsequent fluid administration.

Constriction of the portal vein occurred soon after bleeding started, with the cross-sectional area of the vessels decreasing to 10 to 55 per cent of the control values. Roentgenograms taken fifteen to twenty minutes after blood volume replacement showed widening of the vessels to from 38 to 88 per cent of the original dimensions. In the subsequent few hours, constriction to from 15 to 63 per cent of the original area recurred, whether or not the arterial pressure again fell. It was also found that the degree of constriction before or after transfusion did not prove an index to responsiveness to transfusion. Portal venous pressure measurements during bleeding indicated an increase in the intrahepatic resistance. Hemorrhagic hypotension in four of five dogs produced narrowing of the hepatic venous system. In two dogs, the narrowing was equal to and in two others less than usually occurred in the portal veins.

Films made following administration of dibenamine demonstrated a substantial widening of the portal or

hepatic veins regardless of the stage of shock. That this intrahepatic vascular constriction was active rather than passive was suggested by the observation that replacement of the blood volume deficiency was accompanied by a rise above normal in portal pressure without restoration of the normal caliber of the veins, whereas dibenamine restored normal caliber of the veins whether blood was infused or not.

The authors state that since the net result of the intrahepatic resistance to flow is a deficiency of flow into the vena cava, with a resulting persistent deficiency in cardiac output, it is obvious that a major hemodynamic defect in shock must be attributed to impedance of blood flow through the liver.

Twelve illustrations, including 3 roentgenograms.

WILLIAM H. SMITH, M.D.
University of Louisville

PEDIATRICS

Malignant Disease in Childhood. Cecil G. Teall. *J. Faculty Radiologists* 3: 40-51, July 1951.

In New York City, during the years 1942-44, deaths from malignant neoplasms in childhood exceeded those from any other cause, including tuberculosis (Dargeon: *J. A. M. A.* 136: 459, 1948). In England, during a comparable period, 1945-47, neoplastic disease accounted for about a third as many deaths in children as tuberculosis. These figures do not indicate a true increase in the incidence of neoplastic disease; rather there is an apparent increase due to advances in treatment of other childhood diseases heretofore the major causes of death.

Malignant tumors in childhood are of a different type than those seen in adults. Almost all are of embryonic type, and the sites are different than in adults. Tumors of the breast, stomach, uterus, and lungs are rarely seen in children, while most tumors found in children are rarely seen after puberty.

The usual sites for malignant disease in childhood are the hematopoietic system, nervous system, kidney, and the eye. Most malignant disease causes death before five years but, on the other hand, the cure rate for tumor is highest in this age group. The immediate prepuberty age group is the freest from malignant disease. After puberty, the unusually early adult-type tumors are encountered.

Early diagnosis is all-important in achieving a better cure rate. Radiology plays an important part in investigation of the diseases arising from the hematopoietic tissues, kidney, nervous system, and bone. Tumors of the kidney region occur in the earliest age group, the most important being Wilms' tumor and neuroblastoma of the adrenal medulla.

Wilms' tumor seldom causes urinary symptoms, the first sign usually being the appearance of a mass. The tumor will cause a variable amount of distortion, demonstrable on the pyelogram, or perhaps none at all, depending upon the location. This tumor metastasizes almost exclusively to the lung. The neuroblastoma may be either of the Pepper type or the Hutchinson type. The former grows rapidly and metastasizes to the liver and occasionally to the lung. The latter grows slowly but metastasizes early to the skull and long bones. Neuroblastoma frequently shows punctate calcification roentgenographically and also variable distortion of the pelvis and calyces on the pyelogram. Differentiation of kidney tumor from retroperitoneal sarcoma or neuro-

blastoma arising from retroperitoneal ganglia may often be accomplished simply by comparing supine and prone films of the kidney outline.

The majority of intracranial tumors in children are subtentorial in location, the medulloblastoma being most common. The craniopharyngioma is the most common of the supratentorial type and, while microscopically a benign tumor, from the patient's point of view it has malignant characteristics. It often shows calcification, as do hemangiomas. Separation of sutures is the most constant sign of increased intracranial pressure; rarely is there erosion of the dorsum sellae. Increased digital skull markings seldom indicate true pressure change. Ventriculography is the best means of localization; encephalography is too dangerous, and carotid angiography is not helpful in posterior fossa lesions. If a posterior fossa lesion responds to radiation favorably, it is a medulloblastoma and not an astrocytoma.

Leukemia in children is often of the aleukemic type, and the bone changes may be of help in establishing a diagnosis. The earliest changes may be found in the long bones, where various degrees and manner of osteoporosis and bone absorption are noted. A band of translucency is often found at the metaphysis. Hodgkin's disease is frequently discovered by finding node enlargement in the mediastinum. It may also cause bone changes, but these usually appear later.

Primary malignant bone tumors are usually seen during puberty. Those occurring in childhood most commonly are osteogenic sarcoma and Ewing's tumor. Both are usually first suspected because of pain. The former does not, as a rule, expand the periosteum but breaks through and invades soft tissue. The latter may produce radiating spicules or may cause only reactive thickening of the subperiosteal bone. The two may easily be confused but in the later stages osteogenic sarcoma should be identified with a fair degree of certainty. In a doubtful early case, where it is impossible to say whether a bone lesion is neoplastic or inflammatory, biopsy, although admittedly risky, is indicated. Osteogenic sarcoma, in general, is a surgical disease, while a number of cures by radiotherapy in Ewing's tumor are recorded.

Polypoid tumors of the small bowel often cause intussusceptions. These tumors can be malignant. Reduction of intussusception by the enema method is discouraged, since operative results are just as good, and equally safe, while obviating the risk of missing a malignant tumor.

Eleven roentgenograms; 4 graphs.

JOHN F. RIESSE, M.D.
The Henry Ford Hospital

Retroperitoneal Tumors in Infants and Children. Report of Eighty-Eight Cases. William H. Snyder, Jr., Charles A. Kruse, E. M. Greaney, and Lawrence Chaffin. *Arch. Surg.* 63: 26-37, July 1951.

A survey of 88 retroperitoneal tumors in infants and children is reported. The tumors included embryoma of the kidney (Wilms' tumor), neuroblastoma, benign tumor, and cortical adenoma.

Retroperitoneal tumors occurred, on the average, in one in 1,000 patients consecutively admitted to Los Angeles Children's Hospital and accounted for one in 100 deaths. The average age of the patients was thirty-eight months.

The initial manifestation in one half of the children was swelling of the abdomen. In 88 per cent a mass could be palpated on admission; 61 per cent ran an elevated temperature, and in 46 per cent there was increase in blood pressure. Urinary symptoms, including pyuria, hematuria, and albuminuria, were present in 40 per cent. The most helpful diagnostic studies were intravenous and retrograde pyelography. The findings were abnormal in 87 per cent of the cases, showing distortion or displacement of the kidney, pelvis, or ureter. Roentgenograms of the chest, skull, and long bones showed evidence of metastases in 42 per cent of the cases, with neuroblastoma showing a predilection for the long bones.

Immediate surgical intervention is necessary for a cure. In those cases of Wilms' tumor reaching massive size, preoperative roentgen therapy diminishes the size of the growth and makes surgical removal easier. This should be continued if there is response to the therapy but, to prevent metastasis, surgery should not be delayed more than three weeks. Postoperative roentgen therapy is recommended in all cases and is of especial value in neuroblastoma. Though the latter lesion cannot be entirely removed, a number of long-time survivals have been reported, even in cases in which intra-abdominal metastases have taken place. There were 3 apparent cures in the present series.

Six tables; 5 drawings; 2 charts.

FRANK T. MORAN, M.D.
Lancaster, Penna.

TECHNIC; APPARATUS; CONTRAST MEDIA

Body-Section Roentgenography in the Transverse Plane in Contrast to the Vertical: Advantages and Indications. A. Gebauer. *Fortschr. a. d. Geb. d. Röntgenstrahlen* 75: 9-21, July 1951. (In German)

Body-section roentgenography has been well established during the past fifteen years in the frontal and sagittal planes. More recently interest has been aroused in making body-section films in the transverse plane. Certain advantages are inherent in this newer method.

In body-section views in the frontal plane, it is often difficult to determine the depth of cavities within the lung. Sagittal views help, but there is a question in some instances as to the exact location and relation to surrounding structures. A transverse view gives the exact relationships and cross section of the questionable areas and contributes in some instances to judgment as to surgical approach.

Localization of foreign bodies in this third spatial plane is of great value, giving information as to the depth from the body surface and the relation to the large vessels and skeletal parts, and indicating the best operative approach.

Tumors are often localized more exactly in the transverse plane, and the invasion of vertebral bodies, large vessels, and bronchi may sometimes be established; also associated lymph node metastases may be recognized better than in the other views.

The author reaches the following conclusions:

1. Transverse body-section radiography shows the position, size, and relationship of space-occupying lesions to better advantage than views in the longitudinal planes.

2. The procedure is of special value in examination of the so-called "dead spaces": (a) the spaces anterior and posterior to the heart, (b) dorsal and ventral sinuses

of the lung, (c) the portion of lung posterior to the first rib.

3. The method constitutes a valuable supplementary procedure where pneumoperitoneum, double-contrast filling of the colon, or perineal insufflation are used to demonstrate retroperitoneal masses and other intra-abdominal conditions.

4. In some instances transverse views have been found of value in observation of the base of the skull and other skeletal parts as an adjunct to the usual procedures.

Thirty roentgenograms. E. W. SPACKMAN, M.D.
Fort Worth, Texas

Roentgenologic Apparatus Attachable to the Bell Fracture Table. Ray K. Runge, B. R. Kirklin, and Ralph K. Ghormley. *J. A. M. A.* 146: 1026-1028, July 14, 1951.

Two compact tube assemblies are described for use in connection with the Bell fracture table for obtaining views at right angles in positions which can be exactly duplicated with the least possible disturbance to the surgeon. One unit is mounted directly under the fracture site, suspended rigidly from the table. It contains both a transformer and small tube head. The second unit is mounted near the lower end of the table, for horizontal roentgenography. Both units are operated from a small stand on wheels which occupies only 15 X 16 inches of floor space.

[The apparatus seems excellently designed for the purpose intended, suited for large hospitals with a sufficient volume of orthopedic work to justify the purchase of such highly specialized equipment.]

Five photographs. ZAC F. ENDRESS, M.D.
Pontiac, Mich.

Monophen: A New Medium for Oral Cholecystography. Milton G. Wasch and Bernard S. Epstein. *Am. J. Roentgenol.* 66: 98-102, July 1951.

Monophen, 2-(4-hydroxy-3,5 diiodobenzyl)-cyclohexane carboxylic acid, was employed in over 2,500 patients as a medium for oral cholecystography. The dosage varies between 3 and 4 gm. given as a suspension within a soft gelatine capsule. Double doses are unnecessary.

On review of the first 1,000 cases in which this new medium was used, it was found that 66 per cent of the patients experienced no untoward symptoms. The others showed evidence of nausea, cramps, diarrhea, vomiting, and burning on micturition. In all instances the side effects were far less than those experienced with other media.

The roentgenologic results compared favorably with those obtained with other compounds.

Eight roentgenograms; 1 table.

JOSEPH P. TOMSULA, M.D.
Baton Rouge, La.

Thorotrast Injuries. K.-W. Groskopf, F. Bolck, and H.-J. Büll. *Fortschr. a. d. Geb. d. Röntgenstrahlen* 75: 34-49, July 1951. (In German)

Thorotrast, though having many favorable qualities as a contrast medium, has been shown to be stored in the liver, spleen, and bone marrow, and to lesser degree in other body tissues. The storage of this radioactive material, especially in view of its very long half-life, appears to indicate a real danger in its use.

In animal experiments, the use of Thorotrast has been attended by a definite tendency to carcinomatous changes; "thorotrastomas" have been formed by free dye in the tissue spaces.

A case is reported in which storage of Thorotrast was suspected in the liver, spleen, and paravascular tissues and was proved by demonstration of alpha particles in an excised segment of liver tissue, by means of a photographic emulsion, seven years after the medium had been used for diagnostic purposes.

In spite of the storage of this material, it appears to produce relatively little change in body chemistry or metabolism. In material obtained by sternal puncture there was a slight increase of the fat elements and decrease in the nucleated cells, with prominence of the mature erythroblasts. There was also a slight shift to the left of the white cell elements. In the peripheral blood there was a relative lymphocytosis, and a thrombopenia with a prothrombin time averaging 25.5 seconds. None of these changes, however, was considered significant.

Histologic studies showed fibrous thickening of the liver capsule, expansion and swelling of the collagen elements beneath the capsule (connective tissue) with involvement of the larger bile ducts, and cellular changes in the liver tissue. There were associated changes in the vessel walls with decrease in the elastic components and a measure of narrowing of the vessel lumen.

Because of the above described changes, and in spite of the lack of absolute clinical and morphological proof

of any severe damage, Thorotrast is regarded as potentially dangerous, on the ground of its radioactivity, permanent storage in various tissues, and the possibility of a carcinogenic action.

Thirteen illustrations, including 3 roentgenograms.

E. W. SPACKMAN, M.D.
Fort Worth, Texas

Results of an Inquiry into Accidents Following Intravenous Injection of Contrast Media for Examination of the Urinary System. Jean De Backer. *J. belge radiol.* 33: 318-321, 1950. (In French)

Sixty-three replies were received to an inquiry addressed to some 265 physicians as to complications incident to intravenous urography. The material thus collected represented some 60,000 examinations with 28 serious complications, ranging from phlebitis of the arm to severe syncope. There was a single death in a seriously ill patient in very poor general condition. Fifteen radiologists reported no accidents, and 32 only minor ones, as shoulder pain, urticarial patches, nausea, etc.

The author cites one case to demonstrate the danger of drawing too hasty conclusions regarding the role of the contrast material in an unfortunate outcome. A patient referred for urography was sent back to his bed, because the department was too busy at the time. Half an hour later he died of embolism. Had the examination been undertaken, death would have occurred on the table and would very probably have been attributed to the procedure.

RADIOTHERAPY

Treatment of Some Disorders of the Pituitary by Radiotherapy. A. B. Wayte. *Proc. Roy. Soc. Med.* 44: 450-452, June 1951.

In spite of the fact that irradiation has been used in the treatment of pituitary disorders since as early as 1908, knowledge of its effects on the gland is very incomplete and there is considerable disagreement on suitability, technique, and dosage. Sufficient data have been published, however, to allow some tentative conclusions to be drawn. Results appear to be better in most pituitary conditions when a single course of treatment is given. In an over-all period of three to four weeks, 3,000 to 3,500 r, measured at the pituitary, seems to be most effective. The safe upper limit is probably over 4,000 r.

At Guy's Hospital, London, a technic is used which gives 3,500 r to the pituitary in twenty-eight days. Five ports of entry, 4×4 cm., are arranged over the frontal and fronto-temporal area, avoiding as far as possible any epilation. An emergent beam pointer is employed to insure accurate beam direction. The emergent points are checked radiologically in difficult cases, but they can usually be determined by measurement. At 220 kv. with a half-value layer of 1.9 mm. Cu, each port receives a skin dose of the order of 2,400 r. Treatment is started with 300 r to one field for the first two days; thereafter, two fields daily are treated with 250 to 300 r.

Twenty-three patients have been treated with this method and no untoward symptoms have occurred during treatment. Two patients showed evidence of a mild frontal sinusitis about two weeks after treatment, but this cleared up rapidly with ephedrine chloride, 0.5

per cent in normal saline, as a nasal spray. Epilation has been minimal and the hair has grown again.

Four cases are presented (1 of acromegaly and 3 of Cushing's syndrome).

Two photographs.

Treatment of Carcinoma of the Larynx. Roentgentherapy of Carcinoma of the Larynx. F. Baclesse. *J. Faculty Radiologists* 3: 3-12, July 1951.

Radiotherapy in Cancer of the Larynx: Observations on the Choice of Treatment. V. E. Negus. *Ibid.*, pp. 13-19.

Biological Problems in X-ray Therapy of Intrinsic and Extrinsic Tumours of the Larynx. A. Zuppiiger. *Ibid.*, pp. 20-23.

Roentgentherapy of Cancer of the Larynx. Felix E. Leborgne. *Ibid.*, pp. 24-28.

Functional Results and Permanence of Cure Following Roentgentherapy of Intralaryngeal Carcinomas. Jens Nielsen. *Ibid.*, pp. 29-34.

Roentgentherapy for Cancer of the Larynx. William Harris. *Ibid.*, pp. 35-39.

The papers presented here comprise a symposium presented at the International Congress of Radiology in London, July 1950. The international flavor is apparent from the authorship of the papers; the discussion is timely and offers a cross section of world opinion concerning carcinoma of the larynx. Authorities from France, England, Switzerland, Uruguay, Denmark, and the United States are represented.

Recognition is given to the pioneering efforts of Dr. Henri Coutard, the prime proponent of low intensity roentgen therapy. The impetus of his early work is

responsible in great measure for the present-day status of radiotherapy in this disease.

An intelligent approach to proper treatment of cancer of the larynx demands a generally accepted anatomical classification of the disease. Unfortunately several schemes are in use. The simplest divides lesions into supraglottic, glottic, and subglottic. A more exact designation is desirable and under any circumstance the point of origin of a growth should be identified if possible. Harris describes the popular practice of dividing the processes into intrinsic and extrinsic. Intrinsic lesions are those arising from the free edge of the false cords, the ventricles, the true cords, anterior and posterior commissures, and subglottic areas. Cancers above these sites fall into the extrinsic group and include those of the epiglottis, aryepiglottic folds, arytenoids, false cord lesions above the free border, pyriform sinus and post-cricoid lesions.

A method of clinical staging proposed by Nielsen is based upon comparison with the surgical approach. According to this, the cancers fall into four groups: *Stage I* contains all cases which may be considered operable by laryngofissure and removal of the affected vocal cord; *Stage II* contains cases which require at least somewhat more extensive technics of laryngofissure and excision, what may be called "limited partial laryngectomies;" *Stage III* contains cases judged operable by total laryngectomy, or possibly by hemilaryngectomy; *Stage IV* includes those cases with invasion beyond the limits of the larynx proper by direct extension or metastases to the cervical lymph nodes.

As to the indications for a surgical or radiotherapeutic approach to these lesions there is difference of opinion. Probable response to radiation depends on the clinico-anatomical form of the tumor, its site of origin, and the reactive capacity of the tumor bed. Baclesse feels that cancer of the larynx can be just as effectively treated by radiation as by surgery, no matter what the location. Poor technic, however, can vitiate the potentialities of the method. All the authors note the obviously more satisfactory functional response following radiation therapy, namely, preservation of the voice. Surgical interference for recurrence or radiation failure is preferred.

In the more limited lesions radiation offers just as high a probable cure rate as surgery and should, therefore, be the treatment of choice. Negus warns that irradiation is not suitable in extensive infiltrating growths which show fixation of the vocal folds, and particularly those with subglottic spread and cartilage invasion. In any lesion where doubt exists as to the choice of therapy, irradiation should be attempted first for voice preservation. Surgery, while more difficult after irradiation, can be performed effectively. The closest cooperation between laryngologist and radiotherapist is necessary for a rational disposition of these cases to the best interest of the patient.

There is rather general agreement as to the details of radiation technic. Due to the influence of Coutard's work, fractionated roentgen therapy is favored. Although Negus describes the place of interstitial radium needles in limited lesions and the employment of telradium, their general use is restricted and, of course, technically more difficult.

Two or three fields are employed, usually two opposing transverse and, occasionally, one anteroposterior. These are only slightly larger than the involved area and may be decreased in size with shrinkage of the

tumor and surrounding inflammation. Constant check, during a course of therapy, by direct observation and use of lateral radiography and tomography is advised. The orthodox deep therapy plant is employed, with a radiation intensity of about 20 r per minute. Daily dosage approximates 200 to 300 r. Dose to the center of a lesion averages about 5,000 to 6,000 r. Baclesse treated some cases with a much higher total dosage over periods extending up to twelve weeks. In general, shorter fractionation is applicable in smaller lesions and greater fractionation in extensive lesions and those accompanied by considerable edema. The original text should be consulted for more detailed consideration of technical factors and the reasons for their choice.

Regional lymphadenopathy apparently may be effectively treated by radiation, whether included in the principal fields or as separate areas of approach. The choice of surgery over radiation in treatment of involved lymph nodes is open to speculation. The general radioresistance of lymph node deposits of squamous-cell carcinoma appears to argue for the surgical attack. Prophylactic lymph node irradiation is employed by some, in certain cases, and not by others.

Tracheotomy is not routinely employed. It may be required during treatment as an emergency measure. In doubtful cases it precedes therapy. The fractionated technic and liberal administration of the various antibiotics have obviated the use of tracheotomy in most instances in recent years. Cartilage necrosis, perichondritis, and pneumonia have been greatly minimized by these newer drugs.

Statistical figures on cure rate are, as might be expected, rather complicated. The classification of "limited" and "extensive" lesions varies. Cure rates bear an inverse relationship to extension. Nevertheless, analysis of figures is arbitrary and lesions regarded as cured by some criteria may conceivably be classed as failures by others. In the series of 290 cases of intrinsic cancer of the larynx reported by Baclesse, excluding postoperative recurrence, 61 patients remained free from disease for five years (21 per cent). Cures in this series were rigorously established. In Leborgne's series, including both extrinsic and intrinsic lesions, with similar criteria, 31.1 per cent were symptom-free after five years. For a more detailed statistical analysis reference should be made to the original papers.

Zuppinger followed 107 cases for five to eleven years and 78 for ten to sixteen years after radiotherapy. Several forms of subsequent alteration of the mucous membrane were observed. Atrophy of the lymphatics, telangiectases, especially in the region of the vocal cord and the ventricular band, and occasionally a hematoma of the vocal cord, which was rapidly absorbed, were found. *Laryngitis sicca* with inflammatory exacerbations was fairly frequently encountered but responded well to penicillin. Early perichondritic modifications were no longer observed after the five-year period. Occasionally a *polypus* in the larynx was seen. Edema of the mucous membrane later changed to induration with pallor of the mucous membrane, loss of mobility of the larynx, and obliteration of fine superficial structures. The paucity of serious late changes in this series is attributed to fractionation.

In conclusion, the problem of treatment of carcinoma of the larynx might be summarized in the words of Negus, "Finally, I would emphasize...the need to design treatment with regard to the comfort of the patient while he is alive and with due consideration of

the fate of those who are not cured or are made worse; to be swayed overmuch by... survival rates is... a grave error."

One roentgenogram; drawings, tables, and graphs.

JOHN F. RIESSE, M.D.
The Henry Ford Hospital

Cancer of the Ovary. Results of Experiments in 79 Cases. L. H. Garland and M. A. Sisson. *J. Faculty Radiologists* 3: 66-75, July 1951.

Of the 79 ovarian tumors upon which this report is based, the majority were microscopically identified as papillary adenocarcinoma or cystadenocarcinoma. Next in number were carcinomas of unspecified type, followed in order by pseudomucinous cystadenocarcinomas, unclassified adenocarcinomas, and finally four miscellaneous malignant tumors, of which 2 were dysgerminomas. The difficulties inherent in classifying ovarian tumors as to malignancy are discussed. Several of the cures reported here, as in other series, may not have validity due to the possible mislabelling of a benign tumor.

Ovarian tumors as a group are not radiosensitive. Complete hysterectomy and bilateral oophorectomy is the therapeutic procedure of choice. Extensive irradiation after surgery, however, appears to increase the five-year survival rate and is indicated in all cases except well differentiated Stage I lesions and terminal Stage IV cancers. Of 59 cases in the present series which were given at least one postoperative course of irradiation, 11.8 per cent were arrested for five years.

With the conventional deep therapy plant, 200 kv., h.v.l. 1 mm. Cu, distance 70-80 cm., fields 20 to 35 cm. in diameter, the authors recommend an average tumor dose of 1,500 to 2,500 r in twenty to thirty days as an initial course. Subsequent treatment should vary with individual circumstances; two or three additional courses are feasible over a period of several years.

A number of illustrative case reports are contained in the paper.

Nine tables.

JOHN F. RIESSE, M.D.
The Henry Ford Hospital

Radiation Therapy in Diseases of the Genito-Urinary Tract. William E. Costolow. *Urol. & Cutan. Rev.* 55: 324-327, June 1951.

The author considers the merits of radiation therapy in certain genito-urinary conditions, recounting the experiences of his group at the Los Angeles Tumor Institute, and comments also upon the experiences of others in handling such problems.

Thirty-two cases of Peyronie's disease were treated with radium with the following results: 10 cases were clinically cured, 18 were improved, and 4 showed no improvement. While these results are not spectacular, it is noted that surgery alone, or in combination with irradiation, offers no better results.

Eight cases of carcinoma of the penis were treated. Four patients had survived over five years, and 1 over three years; 3 were dead.

Fifty patients with testicular tumors were treated. The treatment of choice for all tumors except those known to be resistant to radiation, i.e., chorionepithelioma and teratoma, is simple orchiectomy followed by thorough irradiation of lymph-drainage routes. For the 50 cases, the over-all five-year survival rate was 36

per cent. For 23 seminomas, the five-year survival rate was 47 per cent. Metastases were present in 56 per cent of the entire series when first seen, and of those patients with metastatic disease at the beginning of treatment, 33 per cent survived five years or more. The results of others also show the value of vigorous treatment even in the presence of known metastatic disease.

The limited usefulness of radiation in the management of prostatic cancer is mentioned. Even though 95 per cent of carcinomas of the prostate are far advanced when first seen, the author feels that combined use of castration, hormones, and radiation may be of value.

Kidney tumors also are, at best, discouraging. But here again radiation may be employed to advantage: preoperatively to reduce the size of the tumor, making operation possible or simpler to perform; postoperatively as a palliative measure. The author has seen lung metastases disappear after irradiation.

Bladder tumors have long offered a field for radiation therapy, interstitial, external, and even intracavitary methods having been used. These tumors may be treated by (1) fulguration, (2) local resection, (3) radical cystectomy, or (4) radiation. At the Los Angeles Tumor Institute the experience with interstitial radiation had not been good, and once such radiation has been used, external irradiation at a later date is contraindicated. The author feels that external irradiation with supervoltage technic offers more than radon seeds or radium needles. Twenty-four cases of papillary carcinoma of the bladder showed a five-year survival rate of 33 per cent; 33 cases of infiltrating carcinoma showed a five-year survival of 6 per cent, while 17 unclassified cases showed no five-year survival. Clearly the papillary type of carcinoma has a better prognosis than does the infiltrative type. The author feels that a combination of fulguration and external supervoltage radiation offers the best therapeutic possibilities.

SIDNEY KING, M.D.
Chicago, Ill.

Treatment of Acne Vulgaris. George C. Andrews, Anthony N. Domonkos, and Charles F. Post. *J. A. M. A.* 146: 1107-1112, July 21, 1951.

Two years ago the authors decided to try to use for a year only antibiotics and estrogenic substances in the treatment of acne vulgaris and not to employ x-ray irradiation. The present paper describes the results of this experiment, which was based upon certain concepts of fundamental importance. (1) The authors assume that simple cases of oily seborrhea, comedones, and papular acne can be cured by a low-fat diet, the administration of vitamin A and diethylstilbestrol, the expression of comedones, and the use of orthodox local remedies. (2) A second assumption is that in pustular, nodular, and cystic cases the patients usually are sensitized to the *Staphylococcus*. They often harbor foci of infection which contribute to or are the sole cause of the pustulation. The chief treatment is by administration of terramycin, aureomycin, chloramphenicol (chloromycetin), or sulfonamides, and removal of the focal infection. (3) It is further assumed that the staphylococci in pustular cases of acne differ greatly in their susceptibility to the various antibiotics. The best results have been obtained with sulfadiazine, aureomycin, and terramycin.

As a control, the records of 1,287 patients with acne treated by x-rays prior to 1948 were reviewed and 253

cases were selected which met the following requirements: (1) All patients had been treated with x-rays in the period before the newer methods were instituted and had not received estrogenic hormone, chemotherapeutic, or antibiotic therapy. No patient in the group received less than 600 r or more than 1,400 r to the sides of the face (average 1,050 r). (2) Each case was followed for at least one year after treatment was begun (average period of observation for the 253 patients was almost three years). In 152 patients in the control series (60 per cent) the acne was entirely cleared up or improved, in 51 patients (20 per cent) it was not appreciably better or worse, and in the remaining 50 it cleared up for a time and then recurred.

Of the 384 patients in the present series, 175 (45 per cent) had received x-ray irradiation previously, mostly from other dermatologists. Ninety patients (23 per cent) were cured, 276 (71 per cent) were improved, and 18 (6 per cent) unimproved or worse. In other words, in 94 per cent the acne was entirely cleared up or improved. The time of observation has been too short for the number of recurrences to be estimated.

In the authors' opinion, acne is a complicated disease with important medical as well as cutaneous features. Many internal as well as local therapeutic measures must be carefully employed for its efficient treatment. The use of x-rays, in small doses, has a permanent place in the treatment of acne, and the authors may use it again occasionally.

Sixteen photographs.

Chronic Upper Respiratory Tract Infections. R. F. Hendtlass. *Proc. Roy. Soc. Med.* 44: 447-450, June 1951.

This paper is based on a survey of 140 cases of chronic upper respiratory infection treated by radiotherapy at the Royal Northern and Prince of Wales Hospitals, England. Pathologically, these patients suffered from a chronic inflammation of the upper respiratory tract which was evident throughout the lymphoid tissue of the nasopharynx and oropharynx and in half the cases in the maxillary sinus. Forty per cent of the children and 45 per cent of the adults complained of a post-nasal discharge. Seventy per cent of the children and 35 per cent of the adults had enlarged nodes in the neck, and in 80 per cent of the children and 50 per cent of the adults other lymphoid tissue was present. Forty-five per cent of the children had a sinus infection, and in 35 per cent the nasal airway was impaired.

In the treatment the authors employed x-rays primarily, but as more cases were treated they found that a large number required post-nasal radium application as well. Three x-ray fields were used: submental, anterior face, and anterior chest. Dosage was as follows: 150 r (tissue) weekly for four doses through the submental field, with a 7- or 10-cm. square applicator depending on the size of the patient; 200 r (incident) to the anterior facial field for three doses in eight days and 150 r (tissue) to the bronchial nodes for three doses, also in eight days, with a 10-cm. square applicator for both. In a few cases this series was repeated after three or four months, but as time went on radium was used more frequently. In the first field, irradiation was restricted to the floor of the mouth as the portal of entry by attaching to the applicator a sheet of lead rubber with a Ω -shaped portion removed which followed the contour of the mandible. In the second the eyes and lips were protected by lead rubber.

Post-nasal radium application was used for symptoms persisting after varying intervals, but never earlier than six weeks after the end of the x-ray series. Two cylindrical applicators were employed, one passed through each nostril, to converge at the posterior pharyngeal wall. Each tube contained 15 mg. of radium sulfate and gave a dose of 1,500 r at 7 mm. from the radium source in four hours.

Direct intra-oral roentgen irradiation to the tonsils was tried in children, but it was found difficult to keep the whole tonsil in the field. Some adults, however, were effectively treated with a beryllium-window low-voltage tube giving 1,000 r in a single dose with a half-value depth of 11 mm. tissue.

The only ill effect encountered was a transitory dryness of the mouth, in 3 patients.

It was possible to follow only 71 of the patients for a full eighteen months. One half of those lost to follow-up were improved when last heard from. Of the children who had had tonsils and adenoids removed, 70 per cent had masses of lymphoid tissue and 35 per cent sinus infection; following radiotherapy 85 per cent showed immediate improvement and in 70 per cent this was maintained at eighteen months. Of the adults 75 per cent were improved after treatment; after six months all were so improved that they could be classified as symptom-free, though only one-third showed lymphoid regression. The authors believe that a marked symptomatic improvement can be expected at the end of the course of x-rays in 80 per cent of cases. After six months this improvement is maintained in 70 per cent. Radiotherapy was found of particular value in those cases where symptoms persist after tonsillectomy.

One roentgenogram; 1 photograph; 4 drawings; 4 tables.

Roentgen Therapy in Lymphadenosis and Sinusitis in Childhood, with Ten-Year Follow-up of 349 Cases. Harold Levy. *J. Pediat.* 39: 223-236, August 1951.

Roentgen therapy has proved to be a valuable adjunct in the treatment of certain conditions of the ear, nose, throat, and chest in childhood because it has a beneficial effect on infected as well as hyperplastic lymphatic tissue. The author reports on its use in sinusitis and lymphadenosis, defining the latter term as "chronically infected hyperplastic lymphoid tissue of the eustachian tube, nasopharynx, pharynx, adenoid, tonsil, and cervical, retropharyngeal, and perihilar glands." He had treated more than 1,400 patients since 1937.

Questionnaires were sent to 500 patients selected at random from among those treated between 1941 and 1951; 349 responses were obtained and about one-half of that number returned for examination. Results are reported as 70 per cent good, 18 per cent fair, and 12 per cent poor. The average length of follow-up is not stated. It was, of course, well under ten years.

Indications for radiation therapy are outlined by the author as follows:

1. Lymphadenosis.
 - (a) In children under five.
 - (b) In children of all ages who have eustachian tube obstruction, granular pharyngitis, or recurrent cervical adenitis.
2. Sinusitis (subacute or chronic) where the usual methods of therapy have failed, but before surgery is contemplated.

3. Lymphadenosis, with or without sinusitis.
 - (a) In the chronically ill child (cardiac, etc.).
 - (b) In the "non-allergic" asthmatic child.

The ideal subject for roentgen irradiation is a young child with diffuse chronically infected lymphoid hyperplasia in the nose or throat, a watery discharge, and a history of frequent colds and chronic cough. In such cases the condition can be controlled until the patient is old enough for tonsillectomy and adenoidectomy, if needed at that time. Such surgery will not have any effect in the child with intermittently blocked eustachian tubes and recurrent otitis media.

The author uses relatively small doses, 50 r at 135 kv. with 0.25 mm. Cu and 1.0 mm. Al, to each of two lateral ports, with similar fields over the sinuses and mediastinal areas when indicated. Irradiation is given weekly in courses of five to ten treatments. No untoward results were noted in any instance.

Twenty-four roentgenograms; 1 drawing.

GEORGE R. KRAUSE, M.D.
Mt. Sinai Hospital of Cleveland

Importance of Radiotherapy in the Treatment of Ankylosing Spondylitis. J. Jackson Richmond. *Proc. Roy. Soc. Med.* 44: 443-446, June 1951.

The author makes a plea for the earlier diagnosis and institution of radiotherapy in ankylosing spondylitis and analyzes the last 160 cases coming under his care. Seventeen of the patients were females and 143 males, with an average age of thirty-two and a half years. The average interval from the time the patient sought medical advice until irradiation was begun was 3.1 years. The four cardinal diagnostic features were: spinal stiffness, diminished thoracic expansion, raised sedimentation rate, and radiographic changes in the sacroiliac joints. Two symptoms of high clinical importance in the detection of relatively early cases are discomfort or sacroiliac pain on arising from the sitting position and a sensation of constriction of chest movement. Although the erythrocyte sedimentation rate is a diagnostic aid, it was found misleading as an index of response to therapy in the individual case. The roentgenographic appearance of ankylosing spondylitis is discussed only briefly, but attention is called to the difference of opinion as to "whether the earliest changes are due to a par-articular sclerosis or to islands of focal rarefaction at the surfaces of the sacroiliac joints. The important feature is that the relatively discrete line of the joint is soon lost and replaced by an increasing degree of 'blurring.' This is progressively followed by obvious rarefaction and subsequent condensation leading finally to obliteration of the joints."

The author's present technic for treatment of ankylosing spondylitis delivers a surface dose of 2,000 r to each section of the spine over a period of four weeks (1.9 mm. Cu half-value layer; 250 kv.; 1 mm. Cu plus 1 mm. Al filtration). This means that 100 r is delivered to the sacroiliac, lumbar, dorsal, and cervical regions daily for a total of twenty treatment days. In order to minimize the dosage to the ovaries in young women, tangential fields are used when treating the sacroiliac joints.

Although severe constitutional disturbances were uncommon, patients frequently complained of slight nausea and general lethargy. They were instructed to rest as much as possible during the actual course of therapy. Occasionally a mild leukopenia occurred.

Nearly all the patients showed some degree of sympto-

matic improvement following therapy. In 47 per cent of those receiving localized irradiation, *i.e.*, directed to the sacroiliac joints, improvement was maintained (for at least one year); 53 per cent had a recurrence of symptoms. Of the patients in whom the entire spine and sacroiliac joints were irradiated, 80 per cent showed "improvement maintained," only 20 per cent having a recurrence of symptoms.

Four figures; 3 tables.

Hemangioma Associated with Thrombocytopenic Purpura. Report of a Case and Review of the Literature. Samuel C. Southard, Adolph G. DeSanctis, and Robert J. Waldron. *J. Pediat.* 38: 732-737, June 1951.

A female infant was born with a mass on the lower inner aspect of the left thigh. The blood studies, including platelet count, were normal at that time. On the eighteenth day of life, the thigh became enlarged and purplish-red. When examined by the authors, three days later, the infant was limp and lethargic and appeared acutely ill. The lower left leg and foot were edematous, and only the dorsalis pedis pulsation was faintly palpable on the left side. A severe anemia was present with a platelet count of 25,000.

Blood transfusions were given immediately, with improvement in the child's general condition. Bone marrow aspiration revealed no abnormality. A roentgenogram of the left thigh showed only a diffuse soft-tissue mass.

After repeated blood transfusions, the left thigh decreased in size. The hemorrhage and edema subsided, revealing the underlying tumor, which had increased in size. X-ray therapy (h.v.l. 1.0 mm. copper) was given to this mass, avoiding the epiphysis. The tumor dose was 3,360 r in twenty days. The mass shrunk rapidly and disappeared by the twenty-fourth day after the first x-ray treatment. The platelet count rose to normal one week after irradiation was begun.

One small area of the tumor was purposely not irradiated but was preserved for biopsy. This was interpreted as showing a hemangioma of predominantly capillary type. It was felt that the thrombopenia was due to increased destruction rather than decreased production of platelets.

Three photographs; 2 charts.

PAUL W. ROMAN, M.D.
Baltimore, Md.

Possibilities of Combinations of Chemotherapy and of Radiotherapy. R. Sarasin and H. Dubois-Ferrière. *Radiol. clin.* 20: 255-259, July 1951. (In French)

This discussion is concerned mainly with tumors of lymph nodes and more especially lymphogranulomatosis or Hodgkin's disease. When the disease is relatively localized, it seems best to begin treatment with radiotherapy. When the process is relatively widespread, it is suggested that chemotherapy be used at the start, but since most of the chemical compounds known produce remissions of only short duration and usually leave tumor cells behind, local irradiation is given to selected areas. Triethylene melanine seems to be as active as nitrogen mustard and presents the double advantage of oral administration and less violent systemic reaction.

Chemotherapy and radiotherapy should never be started simultaneously because of possible effects on the hemopoietic mechanism. CHALRES M. NICE, M.D.
University of Minnesota

RADIOISOTOPES

Treatment of Hyperthyroidism: An Evaluation of Thyroidectomy, of Prolonged Administration of Propyl Thiouracil, and of Radioactive Iodine. George Crile, Jr., and E. Perry McCullagh. *Ann. Surg.* 134: 18-28, July 1951.

Hyperthyroidism can be safely and effectively controlled by (1) thyroidectomy, (2) propyl or methyl thiouracil, or (3) radioactive iodine. This paper summarizes advantages and disadvantages of each type of treatment as observed at the Cleveland Clinic.

(1) Thyroidectomy after preparation with propyl or methyl thiouracil is the preferred treatment for nodular goiter with hyperthyroidism. The operative mortality is less than 1 per cent and complications are few. Residual or recurrent hyperthyroidism is less common than following operation for Graves' disease; regardless of the technic the incidence was only about 1 per cent. Hypothyroidism is rarely seen postoperatively.

(2) A trial of treatment with propyl or methyl thiouracil is warranted in patients with Graves' disease when associated with small or medium-sized diffuse goiters and in patients whose life expectancy is short or whose surgical risk cannot be improved. A dose of 300 to 400 mg. per day is effective in nearly all cases. Toxic reactions were observed in 2.5 per cent of 218 patients, but in only 3 was withdrawal of the drug necessary. If hypothyroidism develops, it can be controlled by small doses of thyroid. Seventy of 141 patients treated with hope of a cure experienced long-standing remissions after discontinuance of the drug.

(3) Radioactive iodine is the preferred treatment for older patients with Graves' disease, for patients with recurrent hyperthyroidism, for elderly persons with nodular goiter with hyperthyroidism, and for a selected group of younger patients with Graves' disease.

The chemical and physiologic behavior of the radioactive element is exactly the same as that of ordinary iodine. It is concentrated in the thyroid in amounts 10,000 times greater than in other tissues. Thyroid epithelial cells pick up iodine from the blood, incorporate it into the thyroid hormone, and in so doing are destroyed by its irradiation. The amount of irradiation received after an average dose is greater than the amount that can be given by roentgen therapy without damage to the skin. The half-life is only eight days, and two months after the average dose so little radiation remains that it cannot be detected with a Geiger counter. Because of the character of the radiation (chiefly beta rays) no significant damage is done to other tissues.

Evaluation of the physiologic response to a small dose is the easiest and most accurate method of estimating the total requirement. In Graves' disease the initial dose usually given by the authors is one-half to two-thirds of the average total dose of 14 mc. In nodular goiter the dose is usually higher, with an initial dose of 14 to 25 mc. and total dose averaging 42 mc. Advantages of the treatment are: no mortality, no immediate morbidity, no discomfort, and no evidence of carcinogenic effect.

Of 73 patients with Graves' disease treated by the authors and followed for from two months to two years, all showed complete control of the hyperthyroidism, with recurrence in only 1. In 25 patients with nodular goiter and hyperthyroidism followed for a similar

period, the hyperthyroidism was controlled in all and there were no recurrences. Eight of the patients with Graves' disease required desiccated thyroid for hypothyroidism following treatment, but there were no instances of hypothyroidism in the cases of nodular goiter.

In the authors' entire experience with over 400 cases treated with I^{131} , those whose hyperthyroidism was completely controlled appeared to be as well as those with control of hyperthyroidism by thyroidectomy. The diffuse goiters of Graves' disease usually disappear; nodular goiters shrink but remain palpable. When hyperthyroidism is controlled, auricular fibrillation may revert to normal rhythm or, in long standing cases, may persist just as after thyroidectomy.

Six tables.

I. EARL HOLMES, M.D.
University of Louisville

Radioactive Iodine Therapy of Hyperthyroidism: Determination of Optimum Dosage. Bernard J. Sweeney, William H. Daughaday, Leo Gottlieb, Wendell G. Scott, and Cyril M. MacBryde. *South. M. J.* 44: 648-654, July 1951.

This study was undertaken with two aims: first, to evaluate radioactive iodine therapy in hyperthyroidism; second, to explore means of selecting the optimum dose to be administered to each patient. The iodine used was the carrier-free isotope designated I^{131} . It has a half life of eight days, releasing beta and gamma radiation; its decay product is the stable element xenon. Its effectiveness lies in the fact that the thyroid, and particularly the hyperactive thyroid, concentrates the administered radioactive iodine just as it would ordinary iodine, and the short range beta radiations do their destructive work almost entirely within the thyroid, sparing the surrounding tissues.

Three hundred thyrotoxic patients were treated with radioactive iodine. This form of therapy was advised regularly in patients over the age of thirty with hyperthyroidism associated with diffuse goiter and in patients with postoperative recurrence of hyperthyroidism at any age. Certain patients with hyperthyroidism and multinodular goiter were also treated. Treatment of this selected group was felt to be justified because of data collected by Crile (*Practical Aspects of Thyroid Disease*, Philadelphia, W. B. Saunders Co., 1949) showing that carcinoma is an infrequent finding in nodular goiters associated with hyperthyroidism.

Dosage in the patients with diffuse goiter was based on estimation of thyroid size with an attempt to produce a satisfactory remission with a single dose. The patients with nodular goiter and with recurrent hyperthyroidism after previous surgery or external radiation therapy were usually treated with a slightly larger dose than that calculated on the basis of estimated thyroid weight. Most of the patients were given 0.2 millicurie per estimated gram of thyroid tissue. Total single doses ranged from 4 to 50 millicuries.

Favorable results were obtained in all types treated; a satisfactory remission being obtained in 117 of 155 patients followed for six months to three years.

The most frequent complication of radioactive iodine therapy was hypothyroidism, occurring in approximately 25 per cent. Exacerbation of the thyrotoxicosis occurred in 5 cases, but in only 1 case was this considered of clinical significance. Five patients had a relapse

after attainment of euthyroidism but this was controlled in every instance by additional I^{131} . Mild nausea and vomiting occurred, and 2 patients had hoarseness of short duration.

The authors conclude that I^{131} is a valuable therapeutic measure in hyperthyroidism. With further experience a more accurate determination of optimal dose should be possible.

Two charts; 4 tables.

J. M. KOHL, M.D.
Jefferson Medical College

Treatment of Thyroid Carcinoma with Radioactive Iodine (I^{131}). A. Stone Freedberg, Alvin L. Ureles, Mark F. Lesses, and Samuel L. Gargill. *Am. J. Med.* 11: 44-54, July 1951.

This paper summarizes the authors' experience in a study of 11 patients, aged fourteen to seventy-four, with carcinoma of the thyroid gland, of whom 6 were treated with radioiodine (I^{131}).

The efficacy of radioactive iodine (I^{131}) in the 6 cases treated by this substance has been evaluated. In a 14-year-old boy with papillary adenocarcinoma of the thyroid gland and a solitary metastasis in the lung, resolution of the pulmonary lesion followed the administration of I^{131} . This case has been reported in detail elsewhere (*J. A. M. A.* 144: 16, 1950. *Abst. in Radiology* 57: 623, 1951). The therapeutic effects of radioactive iodine were considered worth while in 2 other cases [an addendum to the paper states that one of these patients died eight months after administration of the I^{131}]. In 3 patients no improvement was noted.

Following I^{131} tracer studies, total thyroidectomy was carried out in 2 of the 5 remaining cases in the series and hemithyroidectomy in 3 cases. I^{131} distribution studies or autoradiographs showed no evidence of increased uptake or localization of I^{131} in the tumor tissue. Therapeutic doses of I^{131} therefore were not administered.

Myxedema was induced in each of the 6 patients treated with radioactive iodine, by one or more doses. In 2 patients thyroidectomy had been attempted but was not feasible. In 3 others total thyroidectomy apparently had been accomplished previously. In each instance tracer studies had shown uptakes in the thyroid gland region in the euthyroid range. The total doses ranged from 20 to 209 millicuries; the retention in the gland was 5 to 24 millicuries.

No serious adverse effects of I^{131} have been observed. Transient thyroiditis and radiation sickness occurred in 3 of 6 patients after therapeutic doses. In one patient six months after 108 millicuries of I^{131} a significant decrease in hemoglobin and red blood count was found.

Two roentgenograms; 4 tables.

Uses of Radioactive Gold Colloid in Therapy and Palliation of Neoplastic Disease. William N. Harsha. *J. Kansas M. Soc.* 52: 263-266, June 1951.

Gold¹⁹⁸ has a half-life of 2.7 days, and 90 per cent of the ionizing radiation is contributed by beta particles which have a maximum ionizing range of 8 mm. in tissue and an average range of less than 1 mm. This represents an average energy of 0.44 mev. The remaining 10 per cent is energetic gamma emission.

One-tenth millicurie of gold¹⁹⁸, per gram of tumor if evenly distributed, delivers the equivalent of 7,600 roentgens of ionizing radiation. Actually, however, experiments have shown that the amount of colloidal gold which is tolerated in tissue without producing

sloagging is much higher than would be expected on the basis of this roentgen equivalency. In some cases as much as ten times the calculated safe dose (by x-ray bombardment) can be administered by this means.

Radioactive gold colloid for human use is prepared from neutron-bombarded gold foil, which is converted to a gold chloride by solution in aqua regia and then dispersed in colloidal form by reduction with ascorbic acid in the presence of gelatin. The colloid is put up in sterile vials of standardized activity and shipped by air express. The entire process of activation of the gold to the shipping consumes about twenty hours. The final product has an activity of from 15 to 20 millicuries per c.c. The colloids produced by such chemical technic have particle sizes from 100 to 400 mu; some particles as small as 10 mu are present.

The author presents a series of observations made by others on animals and in man receiving radioactive gold colloid. He refers to his own limited experience as indicating that gold colloid instilled into the thorax or abdomen is readily and evenly distributed to all parts of the space. With therapeutic doses of from 20 to 100 mc. of gold¹⁹⁸, less than 5 per cent of the dose was lost in urine and stools. Within eight hours a peak is reached in the blood, which falls rapidly to near background at thirty-six hours.

The author's technic of gold administration involves administering approximately 30 to 50 mc. of gold, either intrapleurally or intraperitoneally, as the case may demand, and following the patient carefully by determining the amount of gold that is withdrawn in repeated thoracenteses, by special bone marrow studies and hematologic studies, and determination of the specific gravity of the fluid removed from the thorax or peritoneum and its protein content. The patients have local pain for ten to thirty-six hours and frequently experience nausea and vomiting for two or three days, with moderately elevated temperature and chills. The bone marrow depression is significant only when 200 to 250 mc. is exceeded. Hematologic studies must be done serially on such patients.

It is concluded that radioactive gold has an important application in the palliation of fluid formation in neoplastic ascites and hydrothorax.

Two roentgenograms; 3 graphs.

I. MESCHAN, M.D.
University of Arkansas

Radioactive Sodium (Na^{24}) in the Measurement of Local Blood Flow. Robert Semple, Lawson McDonald, and R. P. Ekins. *Am. Heart J.* 41: 803-908, June 1951.

This study was done to determine whether the clearance rate of radioactive sodium (Na^{24}) from muscle after intramuscular injection would measure muscle blood flow indirectly. Measurements were made in normal subjects and in patients with intermittent claudication. Isotonic sodium chloride solution containing 5 microcuries of Na^{24} was injected into the calf to a depth of 2 cm. A Geiger-Müller counter was positioned at the injection site and serial counts were made to establish clearance rates at rest. The patients then did walking exercises of mild, moderate, or severe degree and readings were made shortly thereafter.

The time taken by the radioactive material to decrease by one-half represents its rate of dispersal and is called the "half dispersal time." The value of the rest-

ing half dispersal time varied widely both in the normal group and among the patients with intermittent claudication. Although in most cases the half dispersal time was less after exercise, this was unpredictable in both groups.

The authors state that two conclusions may be derived from their study. Either the Na^{24} clearance did not measure muscle blood flow, or muscle blood flow in the abnormal patients did not differ from the normal under the conditions of the experiment. They felt that the former conclusion was the more probable.

Two charts; 1 table. PAUL W. ROMAN, M.D.
Baltimore, Md.

Significance of the Radiosodium Space in Human Disease. A Comparison with the Thiocyanate Space. Jerry K. Aikawa. *South. M. J.* 44: 654-660, July 1951.

An average man weighing 70 kg. (155 lb.) contains about 49 liters of water, about two-thirds of which is intracellular. The rest is extracellular, being distributed between the vascular and the interstitial fluid spaces. To determine the volume of the extracellular fluid, a known quantity of a test substance is injected intravenously and its concentration in the blood is measured after sufficient time has elapsed for the substance to reach equilibrium in all portions of the extracellular fluid. Such a test substance should meet the following requirements: (1) It should cross the cell membrane slowly if at all. (2) It should be non-toxic in the dose used. (3) It should diffuse rapidly in the extracellular fluid. (4) Its concentration should be easily measured.

The substance which has been most frequently used heretofore is the thiocyanate ion. It is not a physiologic substance, however, and in certain pathologic conditions the results are questionable. Radiosodium well fills all the qualifications for a test substance but has the disadvantage of handling difficulties common to all beta and gamma emitters. Also it has a short half-life. But, while it would be impracticable to use radiosodium in routine studies, or even for prolonged clinical investigations, it was felt that it might well be used to check the results of the thiocyanate test.

Simultaneous determinations of the radiosodium and thiocyanate space in normal individuals have shown

practically identical values up to three hours. After this time, the rate of disappearance of radiosodium from the blood stream falls off faster than that of the thiocyanate ion. The cause of this is not known.

To determine whether comparable results would be obtained in pathologic states, the author performed 32 simultaneous determinations of the thiocyanate and radiosodium spaces in 20 patients with various abnormal clinical conditions such as hypertension, diabetes, myxedema, etc. In these studies the mean thiocyanate space was found at three hours to be 17.3 liters and the mean radiosodium space to be 17.4 liters. The mean difference in these abnormal states was found to be slightly greater than in normal individuals but small enough to imply that the results of the two methods are comparable.

T. FREDERICK WEILAND, M.D.
Jefferson Medical College

Consistency of Clearance of Radioactive Sodium from Human Muscle. L. H. Wisham, R. S. Yalow, and A. J. Freund. *Am. Heart. J.* 41: 810-818, June 1951.

The authors determined the clearance rate of radiosodium from the gastrocnemius and biceps muscles of normal subjects at rest, during moderate exercise, following fatiguing exercise, and during postural changes over a period up to three months. For the exercise studies the biceps muscle was used; for the postural studies, the gastrocnemius. The clearance half-life is the time for the activity initially present to be reduced to half. From this a clearance constant was found.

In the normal subject the rate of clearance remained constant within a relatively narrow range over long periods of time. With moderate exercise, the clearance rate was increased. This increase was also fairly constant with the same amount of work. With fatiguing exercise the clearance rate increased also and remained constant on subsequent repetition of the experiment. Postural change had no significant effect.

The authors feel that this method of measuring the clearance of radioactive sodium can be used as a measure of gross changes of blood flow over a considerable period of time.

Four graphs; 2 tables. PAUL W. ROMAN, M.D.
Baltimore, Md.

RADIATION EFFECTS

A Rare Form of Malignant Joint Tumor. Arnold Sonnenschein. *J. Bone & Joint Surg.* 33-A: 719-722, July 1951.

All true joint tumors, benign or malignant, are derived from mesodermal tissue. Even though a tumor is grossly restricted to the joint area, if it presents cellular forms which are not of mesodermal derivation, it does not originate from the joint structures.

A 33-year-old man had a swelling in the left knee at the age of ten. This progressed, and about a year later some type of operation was performed. The condition, however, became gradually worse, with pain on movement and weight-bearing. The patient was first treated by extension, which was followed by the development of sinus tracts. Roentgen irradiation was given to these intermittently, with heliotherapy as the weather permitted. The swelling increased, however, and drawing and burning pain led the patient to seek hospitalization.

Roentgenograms now revealed what appeared to be

a malignant bone tumor, and a mid-thigh amputation was performed. The pathologic diagnosis was squamous-cell carcinoma infiltrating chronically inflamed connective tissue containing typical tubercles. Death occurred two years later of other causes, and no evidence of tumor was found at autopsy.

The author believes that this patient had a tuberculosis of the knee with chronic fistula formation. Under the influence of heliotherapy and roentgen irradiation, the epithelium grew along the sinus tracts to the center of the joint, and the small islands of squamous epithelium thus formed developed, as a result of constant irritation by purulent secretion, into a malignant tumor.

The conclusion is that resection should be undertaken as soon as growth has ceased in all cases of pyogenic joint disease with fistula formation.

One roentgenogram; 3 photographs; 1 photomicrograph.

JOE B. SCRUGGS, JR., M.D.

University of Arkansas

INDEX TO VOLUME 58

A

- ABBOTT, OSLER A.:** Rationale of the modern diagnostic approach to mediastinal tumors (ab), May, 766
- and **HOPKINS, WILLIAM A.:** Diagnosis and preoperative management of congenital esophageal atresia and tracheoesophageal fistula (ab), Jan., 139
- HOPKINS, WILLIAM A., LEIGH, TED F., and VAN FLEIT, WILLIAM E.:** Significance and management of peripheral pulmonary masses (ab), April, 602
- ABDOMEN**
See also under names of abdominal organs
- acute conditions: roentgen diagnosis (ab), Leo G. Rigler, June, 904
 - angiography (ab), Charles T. Dotter, et al, March, 467
 - comparative study of x-ray transmission in thorax and abdomen in living subjects, Joseph R. Nahon and Carrol P. Naidorf, Feb., 241
 - distortion and displacement of renal pelvis and calices by extrarenal lesions (ab), J. O. V. Cole, March, 467
 - intra-abdominal calcification in an infant; case (ab), Nathan Epstein and Joseph A. Ritter, Feb., 300
 - organ-displacing abdominal tumors (ab), John J. Morton, April, 623
 - retroperitoneal tumors in infants and children; 88 cases (ab), William H. Snyder, Jr., et al, June, 911
 - small intestinal rupture due to non-penetrating abdominal injury: roentgenological studies (ab), George Jacobson and Ray A. Carter, June, 903
- roentgenography. See Pneumoperitoneum; Retroperitoneum
- ABELES, HANS, and CHAVES, AARON D.:** Significance of calcification in pulmonary coin lesions, Feb., 199
- ABRAMS, HERBERT L., and ALWAY, ROBERT H.:** Tricuspid atresia. Report of three cases and evaluation of diagnostic criteria (ab), March, 453
- ABSCESSES.** See Brain; Liver; Perinephritis; Spine
- ACETABULUM**
—protrusion acetabuli (Otto-Chrobak pelvis): its pathogenesis and roentgen symptomatology (ab), F. Klopfer, Feb., 306
- ACETYLAMINOFLUORENE.** See Fluorene
- ACETYLCHOLINE**
—intestinal gas in radiology (use of acetylcholine and pituitary extract) (ab), M. Arias Bellini, March, 470
- ACHONDROPLASIA**
—chondrodystrophia calcificans congenita; case, Eugene M. Savignac, March, 415
- ACKERMAN, ALFRED J.** See **MOYER, JOHN H.**
- ACKERMAN, LAUREN V., and TAYLOR, FREDERICK H.:** Neurogenous tumors within the thorax. A clinico-pathological evaluation of forty-eight cases (ab), June, 895
- ACLASIS, DIAPHYSIAL.** See Exostoses
- ACNE VULGARIS**
—treatment (ab), George C. Andrews, et al, June, 915
- ACROSCLEROSIS**
—dental roentgenologic manifestations of systemic disease III. Granulomatous disease, Paget's disease, acrosclerosis and others, Edward C. Stafne, June, 820
- ACTINOMYCOSIS**
—advanced actinomycosis of spine treated with penicillin and streptomycin; case (ab), M. S. Brett, April, 614
- gastric actinomycosis; case (ab), H. G. Schmitt, Jan., 141
- of bone, with special reference to infection of vertebral column (ab), V. Zachary Cope, April, 614

ADAMS, FORREST H., VEASY, GEORGE, JORGENSEN, JOSEPH, DIEHL, ANTONI, LABREE, JOHN W., SHAPIRO, M. J., and DWAN, PAUL F.: Congenital valvular pulmonary stenosis with or without an interatrial communication: physiologic studies as diagnostic aids (ab), Feb., 293

ADAMS, HERBERT D. See **SOUDERS, CARLTON R.**

ADAMS, JOHN E.: Tracer studies with radioactive phosphorus (P^{32}) on the absorption of cerebrospinal fluid and the problem of hydrocephalus (ab), March, 477

ADDINGTON, E. A. See **TEMPLETON, F. E.**

ADENOMA. See Tumors, adenoma

ADENOMATOSIS. See Lungs, tumors

ADHESIONS. See Lungs

ADOLESCENCE
—Cooley's erythroblastic anemia; some skeletal findings in adolescents and young adults (ab), John Caffey, March, 460
- juvenile nasopharyngeal angiofibroma (ab), R. W. Kerwin, Feb., 315

ADRENAL PREPARATIONS
—changes in composition of blood plasma of rat during acute radiation syndrome, and their partial mitigation by dibenamine and cortin (ab), Henry I. Kohn, March, 478
- relapsing panniculitis (Weber-Christian disease); review of literature and report of case including treatment with cortisone (ab), Charles R. Shuman, March, 476

ADRENALS
—adrenal shielding and survival of rats after x-irradiation (ab), Abraham Edelmann, Feb., 321
- causes of failure of suprarenalectomy and ganglionectomy in thrombo-angiitis obliterans on basis of 898 operations (ab), René Leriche, Feb., 310

- effect of immaturity, hypophysectomy and adrenalectomy upon changes in blood plasma of rat during acute radiation syndrome (ab), Henry I. Kohn, March, 479
 - relationship between the adrenal cortex and radiation sickness: review of literature and presentation of new data, Edward C. Porter, Feb., 246
 - roentgen demonstration of adrenals and kidneys by perirenal air insufflation (ab), F. Kokas and Z. Zsombok, Jan., 152
- ADY, ALBERT E.** See **DUBLIN, JOHN W.**
- AEGERTER, ERNEST.** See **ROSEMOND, GEORGE P.**
- See **ZATUCHNI, JACOB**
- AGAZZI, C., and BELLONI, L.:** Non-osteogenic fibroma of the jaw (ab), May, 780
- AGED**
—clinical diagnosis of arteriosclerosis in aged, with particular reference to interpretation of roentgen findings (ab), Frederic D. Zeman and Max Schenk, June, 910
- AIKAWA, JERRY K.:** Significance of the radiosium space in human disease. Comparison with the thiocyanate space (ab), June, 920
- AITKEN, ALEXANDER P., and MAGILL, H. KELVIN:** Calcareous tendinitis of the flexor carpi ulnaris (ab), Feb., 306
- ALBRECHT, K., and DRESSLER, W.:** Demonstration of the brain vessels with viscous Parabrodil M (35 per cent) (ab), May, 754
- ALFRED, KARL S.:** Surgical treatment of herniated lumbar intervertebral discs; follow-up study of 130 patients without spinal fusion (ab), March, 463
- ALLDRED, A. J., and HIGGINS, T. T.:** Ectopic ureter in childhood with an account of four personal cases (ab), March, 467
- ALLEN, HERBERT C., Jr., and GOODWIN, WILLIAM E.:** Scintillation counter as an instrument for in vivo determination of thyroid weight, Jan., 68
- LIBBY, RAYMOND L., and CASSEN, BENEDICT:** Scintillation counter in clinical studies of human thyroid physiology using I^{131} (ab), April, 631
- ALLEN, J. GARROTT, MOULDER, PETER V., and ENERSON, DANIEL M.:** Pathogenesis and treatment of the postirradiation syndrome (ab), Feb., 321
- ALLENDE, GUILLERMO, and LEZAMA, LUIS G.:** Fractures of the neck of the femur in children: clinical study (ab), March, 465
- ALPER, T., SAVAGE, D. V., and BOTHWELL, T. H.:** Radioiron studies in a case of hemochromatosis (ab), May, 794
- ALPERS, BERNARD J., and YASKIN, H. EDWARD:** Pathogenesis of ophthalmoplegic migraine (ab), March, 445
- ALPHA PARTICLES.** See Polonium
- ALUMINUM**
—aluminum lung (ab), Karl-Heinz Ehrecke, May, 761
- ALVEOLAR-CELL TUMORS.** See Lungs
- ALWAY, ROBERT H.** See **ABRAMS, HERBERT L.**
- AMEBIASIS.** See Liver
- AMERICAN BOARD OF RADIOLOGY,** notice to diplomates, March, 428
- AMERICAN COLLEGE OF RADIOLOGY,** announcement of group plan of disability income protection, June, 885
- AMMONIUM COMPOUNDS.** See Barbitone
- ANACKER, H.:** Experience in the diagnosis of pulmonary carcinoma (ab), Jan., 132
- ANAPHYLAXIS**
—transient periods of cardiac enlargement associated with hypersensitivity to different etiologic agents; case (ab), C. A. McKinlay, June, 897
- ANDERSON, HAROLD E.** See **ANDERSON, NELSON P.**
- ANDERSON, J. R., and WAPSHAW, H.:** Annular pancreas (ab), May, 775
- ANDERSON, JOHN.** See **GARRISON, HUGH**
- ANDERSON, KIRK J.:** Synovial sarcoma; clinical impression obtained from the study of thirteen cases (ab), March, 462
- ANDERSON, NELSON P., and ANDERSON, HAROLD E.:** Development of basal cell epithelioma as a consequence of riodermatitis (ab), April, 632
- ANDERSON, ROBERT:** Diodrast studies of the vertebral and cranial venous systems, to show their probable role in cerebral metastases (ab), May, 755
- ANDERSON-BERRY PRIZE,** May, 742
- ANDREWS, G. A.** See **FURTH, JACOB**
- ANDREWS, GEORGE C., DOMONKOS, ANTHONY N., and POST, CHARLES F.:** Treatment of acne vulgaris (ab), June, 915
- ANDREWS, J. ROBERT, and COPPEDGE, THOMAS O.:** Dose-time relationship for the cure of squamous cell carcinoma (ab), May, 788
- ANDROGENS**
—androgen therapy in control of pulmonary metastasis from adenocarcinoma of corpus uteri; case benefited by androgen therapy (ab), John H. Freed, et al, March, 474
- ANEMIA**
—anemia of cancer patients and its relation to metastases to bone marrow (ab), Shu Chu Shen and F. Homburger, Jan., 151
- erythroblastic
- Cooley's anemia; some skeletal findings in adolescents and young adults (ab), John Caffey, March, 460

ANEMIA—cont.**sickle-cell**

- roentgen studies of maxillae and mandible, Irwin B. Robinson and Bernard G. Sarnat, April, 517

ANESTHESIA. See Heart, abnormalities**ANEURYSM****aortic**

- contribution to x-ray diagnosis of aneurysm of ascending aorta (ab), Kurt Breckhoff, Jan., 138
- dissecting aneurysm of abdominal aorta simulating renal disease: case diagnosed antemortem (ab), Henry A. Kontoff and Bernard R. Sears, Feb., 310
- multiple aneurysms with unusual locations (ab), Richard Haubrich, Jan., 139

arteriovenous. See Aneurysm, pulmonary**cardiac**

- clinical and electrocardiographic analysis (ab), John H. Moyer and Glenn I. Hiller, Feb., 292
- of cardiac apex in a child (ab), J. Papillon, et al, May, 767

cerebral

- deliberate thrombosis of intracranial arterial aneurysm by partial occlusion of carotid artery with arteriographic control: preliminary report of case (ab), Arthur Ecker and Paul Riemenschneider, March, 441
- pathogenesis of ophthalmoplegic migraine (cerebral aneurysm as possible cause) (ab), Bernard J. Alpers and H. Edward Yaskin, March, 443

innominate

- broadening of innominate artery (truncus brachiocephalicus) (ab), Hans-Georg Meyer-Krahmer, Jan., 154

popliteal

- method of dealing with arteriosclerotic popliteal aneurysms (ab), Joseph M. Janes and John C. Ivins, Feb., 310

pulmonary

- aneurysm of pulmonary artery (ab), M. G. Israels, April, 621
- arteriovenous aneurysms and their relation to Osler's disease (ab), Chr. Heding, et al, May, 764

ANGINA PECTORIS

- radioactive iodine in treatment (ab), Charles C. Wolferth, et al, March, 477

ANGIOCARDIOGRAPHY. See Arteries; Cardiovascular System; Heart; Mediastinum; Tuberculosis, Pulmonary**ANGIOFIBROMA.** See Tumors, angiofibroma**ANGIOGRAPHY.** See Abdomen; Arteries; Brain; Carotid Body**ANGIOMA.** See Tumors, angioma**ANTHONY, WALTER P., and WILLIAMS, HENRY L.:** Unilateral pansinal mucocele simulating a malignant neoplasm. Report of a case (ab), Jan., 130**ANTIHISTAMINIC AGENTS**

- effect of x-radiation and antihistamine drugs on reticulo-endothelial system measured with colloidal radiogold (ab), Jack Barrow, et al, Feb., 322

ANTONIUS, NICHOLAS A. See DOWNING, DANIEL F.**ANUS.** See Fistula; Rectum**AORTA****See also Aneurysm; Cardiovascular System**

- anomalous origin of right subclavian artery from descending aorta: 2 cases (ab), W. C. Sealy, Feb., 309
- atresia with hypoplasia of left heart and aortic arch (ab), Sidney Friedman, et al, Feb., 293
- congenital pulmonary stenosis without overriding aorta: clinical study (ab), Y. Larsson, et al, June, 901
- coarctation. See Aorta, stricture
- roentgenography. See also Aorta, stricture
- abdominal aortography in urology: preliminary report (ab), I. H. Griffiths, March, 466
- aortography with oxygen as contrast medium: preliminary clinical and experimental results (ab), A. D'Errico, June, 899
- congenital heart disease. Angiocardiography, aortography, and cardiac catheterization (ab), Daniel F. Downing, et al, Jan., 137
- evaluation of surgical kidney employing translumbar aortography (ab), A. Keller Doss and Humberto Quirarte, Feb., 307
- percutaneous arterial catheterization in dogs with special reference to aortography (ab), E. Converse Peirce, II, March, 469
- percutaneous femoral artery catheterization in man with special reference to aortography (ab), E. Converse Peirce, II, June, 899
- syringe wired for automatic x-ray exposure, Nathan Flax and Robert Waldron, May, 726
- translumbar aortography: its value in diagnosis, management and prognosis of renal pathology (ab), Watterson Reagan, June, 908

stricture

- aortic deformity simulating mediastinal tumor: a sub-clinical form of coarctation (ab), Carlton R. Souders, et al, June, 900
- diagnosis of stenosis based on study of 25 proved cases (ab), David Lewis, Jan., 138
- stenosis of isthmus. Roentgenographic studies of normal and diseased hearts, the great vessels and transmitted pulsations (ab), Alfred Vogt, Jan., 138
- thoracic aortography, with special reference to its value in patent ductus arteriosus and coarctation of aorta (ab), Gunnar Jonsson, et al, June, 898

AORTIC VALVE

- calcification of aortic valve and coronary arteries (ab), David Pyke and Cecil Symons, June, 909

APPARATUS. See Roentgen Rays, apparatus**APPENDIX**

- acute appendicitis, with radiopaque appendiceal lithiasis (ab), Eugene G. Laforet, et al, May, 773
- calculi: 2 cases and brief review of literature (ab), C. F. Chapple, March, 458
- mucocele (ab), David S. Likely and Condit W. Cutler, Jr., April, 609
- roentgen features of non-malignant periappendiceal and ileocecal lesions (ab), Charles Gottlieb, et al, Feb., 297

ARACHNOID

- lumbar spinal arachnoiditis: complication of intervertebral disk operation (ab), Edmund A. Smolik and Francis P. Nash, March, 463

ARBUSE, DAVID I.: Some general and neurologic aspects of atomic medicine (ab), Feb., 316**ARIAS BELLINI, M.:** Intestinal gas in radiology (ab), March, 470**ARNHEIM, ERNEST E.:** Congenital malformations of the rectum and anus, with special reference to the treatment of associated fistulas (ab), May, 772**ARRIETA SANCHEZ, L.:** Two cases of hepatosplenography with thorotrast, injected 16 and 14 years ago, respectively (ab), March, 458**ARTERIES****See also Aneurysm; Aorta; Brain; Cardiovascular System; Thrombosis; etc.****carotid**

- collateral cerebral circulation as demonstrated by carotid angiography (ab), A. Torkildsen and K. Koppang, March, 441

- deliberate thrombosis of intracranial arterial aneurysm by partial occlusion of carotid artery with arteriographic control: preliminary report of case (ab), Arthur Ecker and Paul Riemenschneider, March, 441

- some examples of the diagnostic value of percutaneous carotid angiography (ab), Knut Koppang, Jan., 128

coronary. See Coronary Vessels**femoral**

- percutaneous arterial catheterization in dogs with special reference to aortography (ab), E. Converse Peirce, II, March, 469

- percutaneous femoral artery catheterization in man with special reference to aortography (ab), E. Converse Peirce, II, June, 899

gastric

- neurovascular mechanism of stomach and duodenum (ab), H. B. Benjamin, Feb., 294

innominate

- angiocardiac study, Edward I. Honig, Israel Steinberg, and Charles T. Dotter, Jan., 80

- broadening (truncus brachiocephalicus) (ab), Hans-Georg Meyer-Krahmer, Jan., 154

meningeal

- arteriovenous fistula between middle meningeal artery and greater petrosal sinus (ab), Edgar F. Fincher, May, 787

pulmonary

- congenital stenosis: postoperative observations on 214 children (ab), C. R. Leininger, et al, March, 448

- congenital stenosis without overriding aorta: clinical study (ab), Y. Larsson, et al, June, 901

- in bronchiectasis (ab), Walter G. Gobel, Jr., et al, March, 451

- interlobar sequestration of lung associated with abnormal pulmonary artery: case (ab), C. McDowell, et al, May, 764

- unipolar electrocardiography in stenosis (ab), R. M. Marquis, Jan., 139

roentgenography

- arteriography in 2 cases of malignant tumors (melanoma and neurinoma) (ab), Torfinn Denstad, March, 469

- evaluation of translumbar arteriography (ab), Parke G. Smith, et al, May, 785

subclavian

- anomalous origin of right subclavian from descending aorta: 2 cases (ab), W. C. Sealy, Feb., 309

- new method for demonstrating an aberrant right subclavian artery, Robert L. Raphael, Truman G. Schnabel, Jr., and Simon S. Leopold, Jan., 89

vertebral

- vertebral angiography by catheterization: new method employed in 221 cases (ab), Stig Radner, Jan., 128

ARTERIOGRAPHY. See Arteries; Brain**ARTERIOSCLEROSIS**

- clinical diagnosis of arteriosclerosis in aged, with particular reference to interpretation of roentgen findings (ab), Frederic D. Zeman and Max Schenk, June, 910

- method of dealing with arteriosclerotic popliteal aneurysms (ab), Joseph M. Janes and John C. Ivins, Feb., 310

ARTHRITIS. See Spine, arthritis**ARTHROGRAPHY.** See Joints**ARTHROKATADYSIS.** See Pelvis**ARVAY, N. See LEGER, L.****ASH, RACHEL.** See FRIEDMAN, SIDNEY**ASHBY, D. W., WILLIAMS, G. E. O., and SMITH, O. E.:** Bone dystrophy associated with muscular dystrophy (myopathy) (ab), May, 778**ASHKENAZY, MOSES, DAVIS, LOYAL, and MARTIN, JOHN:** Evaluation of the technic and results of the radioactive iodo-fluorescein test for the localization of intracranial lesions (ab), March, 442**ASTROCYTOMA.** See Tumors, astrocytoma

- ATELECTASIS.** See Lungs, collapse
- ATKINSON, ARTHUR J.** See **WHEELOCK, MARK C.**
- ATLANTO-EPISTROPHAL JOINT.** See Atlas and Axis
- ATLAS AND AXIS**
- atlanto-axial fracture-dislocation (ab), G. O. Tippet, Jan., 148
 - demonstration of atlanto-epistropheal joints and transverse processes of atlas and second cervical vertebra (ab), C. Buetti, April, 622
 - platybasia: 10 cases with comments on familial tendency, a special diagnostic sign, and end results of operation (ab), William B. Scoville and Irving J. Sherman, March, 444
 - use of tomography in diagnosis of basilar impression (ab), Vladimir Gvozdanović and Sergije Dogan, Jan., 129
- ATOMIC ENERGY**
- See also Radioactivity
 - acute radiation syndrome: problem for practitioners (ab), John Z. Bowers, Jan., 159
 - medical problems in atomic warfare (ab), James P. Cooney, Jan., 159
 - pathology of ionizing radiation (ab), Elbert De Coursey, March, 480
 - physician's problem in atomic warfare (ab), James P. Cooney, March, 480
 - physician's task in the atomic explosion (ab), Heinz R. Landman, Feb., 324
 - some general and neurologic aspects of atomic medicine (ab), David I. Arbuse, Feb., 316
- ATWELL, SHERMAN W.:** Standardized oblique roentgenography of the chest (ab), April, 600
- AUVERT, J.** See **LEGER, L.**
- AZYGOS VEIN.** See Lungs, abnormalities
- B**
- BACLESSE, F.:** Roentgentherapy of carcinoma of the larynx (ab), June, 913
- BACTERIA**
- splanchic removal of bacteria from circulating blood of irradiated rabbits (ab), J. Lamar Callaway and Grace P. Kerby, Jan., 160
- Friedlander's.** See Osteomyelitis
- BALL, ROBERT P.** See **DOTTER, CHARLES T.**
- BALL, SIMON:** Ossifying fibroma of the frontal sinus (ab), Feb., 285
- BANKS, L. OTTO.** See **SCOTT, ROLAND B.**
- BANTHINE**
- oral bantnine, an effective depressor of gastro-intestinal motility (ab), Michael J. Lepore, et al, March, 455
- BARBITAL AND BARBITAL DERIVATIVES**
- effect of barbiturates and other drugs on mortality from diodrast in mouse (ab), H. Haskell Ziperman, et al, Feb., 311
- BARIUM**
- See also Gastro-Intestinal Tract: Rectum
 - modification with methocel (ab), Mark M. Marks, Feb., 294
- BARKER, HAROLD G.** See **BRUNER, H. D.**
- BARNARD, LEONARD:** Osseous metastases of adenocarcinoma of the thyroid (ab), Feb., 317
- BARNES, ALLAN C.** See **MORTON, JOSEPH L.**
- BARROW, JACK, TULLIS, JOHN L., and CHAMBERS, F. W., Jr.:** Effect of x-radiation and antihistamine drugs on the reticulo-endothelial system measured with colloidal radiogold (ab), Feb., 322
- BARRY, A. P.:** Carcinoma of the uterine cervix: the need for combined radiation and surgical treatment (ab), Jan., 155
- BARTH, EARL E.** See **O'CONOR, VINCENT J.**
- BASILAR IMPRESSION.** See Atlas and Axis
- BASILE, ALFREDO R., and ELPERSY, MARCOS:** Lithiasis of Meckel's diverticulum. Report of a case (ab), May, 773
- BASSETT, ROBERT C.** See **FALLS, HAROLD P.**
- BAUX, R.** See **DUQUING, J.**
- BAYER, O.:** Syndrome of Taussig and Bing (ab), May, 767
- BEAM, A. S.** See **HAHN, P. F.**
- BEATO NUÑEZ, VIRGILIO, and PONS DOMENECH, ELMO R.:** Heart puncture. II. Cardioangiography: clinical and electrocardiographic results (ab), June, 807
- See **PONS DOMENECH, ELMO R.**
- de BEAUJEU, M.** See **SANTY, P.**
- BEAZELL, JAMES M.** See **SCHMIDT, C. ROBERT**
- BECK, ERWIN.** See **PATTISON, JOHN D., Jr.**
- BECK, H. R.:** High diverticula of the stomach (ab), Jan., 141
- BECLÈRE (ANTOINE) CENTRE,** April, 586
- BEELER, THOMAS T.** See **ERNST, K. F.**
- BEIERWALTES, WILLIAM H.:** Irradiation of the pituitary in the treatment of malignant exophthalmus (ab), March, 471
- BELCHER, E. H., and EVANS, H. D.:** Localisation of cerebral tumours with radioactive derivatives of fluorescein. Physical limitations (ab), April, 598
- BELL, A. L., and ZWANGER, JEROME:** A simple accurate plane and incline indicator, Feb., 259
- BELL, JOSEPH CLARK (ed),** Feb., 261
- BELL TABLE.** See Fractures
- BELLER, AARON J.:** Syndrome of brain abscess with congenital cardiac disease. Report on a case with complete recovery (ab), Feb., 285
- BELLONI, L.** See **AGAZZI, C.**
- BENJAMIN, H. B.:** Neurovascular mechanism of the stomach and duodenum (ab), Feb., 294
- BENSON, CLIFFORD D., and COURY, JOHN J.:** Congenital intrinsic obstruction of the stomach and duodenum in the newborn (ab), May, 769
- BENZING, WILLIAM, Jr.:** Wilms' tumor of infancy and childhood, May, 674
- BERANBAUM, SAMUEL L.** See **GOTTLIEB, CHARLES**
- BERENS, DAVID L.** See **MURPHY, WALTER T.**
- BERGIN, J. H. E.:** Advantages and disadvantages of salpingography with particular reference to the use of diodone viscous (ab), Jan., 152
- BERGMAN, PHILIP S.** See **COHEN, IRA**
- BERGSTROM, I.** See **LINDGREN, E.**
- BERIBERI**
- beriberi heart in Iowa veterans (ab), Charles H. Gutenkauf, Feb., 292
- BERNARD, ETIENNE, and MEYER, ANDRE:** Treatment of non-tuberculous spontaneous pneumothorax (ab), May, 763
- BERNEY, PAUL W.:** Osteoporosis, a review (ab), April, 612
- BERNSTEIN, ARTHUR, KLOSK, EMANUEL, SIMON, FRANKLIN, and BRODKIN, HENRY A.:** Large thymic tumor simulating pericardial effusion (ab), March, 452
- BERTIGLIA, BRUNO:** Neoplastic alterations in the ribs. A roentgen diagnostic contribution (ab), Jan., 148
- BERYLLIUM WINDOW TUBES.** See Roentgen Therapy
- BETA RAYS.** See Radiations; Radioactivity; Radium
- BETATRON**
- betatron cancer therapy, Roger A. Harvey, Lewis L. Haas and John S. Laughlin, Jan., 23
 - comparison of dose distributions in patients treated with x-ray beams of widely different energies, Hugh Garrison, John Anderson, John S. Laughlin, and Roger A. Harvey, March, 361
- BIBER, DAVID, and BUCKLER, ARTHUR:** Migratory pneumonia without eosinophilia (ab), April, 604
- BICKERSTAFF, EDWIN R.:** Changes in the cerebrospinal fluid after pneumoencephalography (ab), May, 755
- BICKFORD, B. J., and WILLAMSON, J. C. F. LLOYD:** Annular pancreas (ab), May, 775
- BIERMAN, HOWARD R.** See **KELLY, KEITH H.**
- BILE DUCTS**
- See also Biliary Tract
 - benign stricture of intrahepatic ducts (ab), R. Franklin Carter and Lee Gillette, Jan., 145
 - operating room cholangiograms (ab), Arthur Zierold, April, 610
 - studies on hepatic ducts in cholangiography (ab), Okof Norman, Jan., 145
- BILIARY TRACT**
- See also Bile Ducts; Fistula; Gallbladder; etc.
 - congenital absence of gallbladder; cholangiography; gallstone solvents (ab), A. H. J. Rains, May, 774
 - peritoneoscopic cholangiography (ab), Philip G. Keil and S. N. Landis, May, 773
- BING SYNDROME.** See Heart, abnormalities
- BIOSYNTHESIS.** See Nucleins
- BLACKWOOD, W., MOSBERG, WILLIAM H., Jr., and ROBINSON, P. K.:** Brain tumor with normal air encephalography and arteriography. Report of an unusual case (ab), March, 443
- BLADDER**
- calculi
 - limitations of roentgen rays in diagnosis (ab), Fay H. Squire and Herman L. Kretschmer, Jan., 134
 - cancer
 - results with radiotherapy (ab), J. L. E. Millen, March, 474
- BLADES, BRIAN.** See **COOKE, FRANCIS N.**
- BLALOCK-TAUSSIG OPERATION.** See Heart, abnormalities
- BLASTOMYCOSIS**
- of lung (ab), C. C. Lowry, et al, May, 762
- BLOOD**
- See also Anemia; Leukemia; etc.
 - splanchic removal of bacteria from circulating blood of irradiated rabbits (ab), J. Lamar Callaway and Grace P. Kerby, Jan., 160
 - tumor-host studies. Alteration of thyroid, skin, blood, and tumor uptake of ^{131}I -tagged diiodotyrosine in rats by transplanted tumors (ab), Kenneth G. Scott and Robert S. Stone, Feb., 320
 - determination of circulation factors with radioactive substances (radio-circulography) (ab), P. Waver and W. Hunzinger, May, 792
 - diversion of venous blood flow through transverse sinuses in one-sided innominate vein obstruction, A. Schwartz and M. Fraenkel, May, 728
 - measurement of blood flow by the local clearance of radioactive sodium (ab), H. Miller and G. M. Wilson, March, 478
 - radioactive sodium (Na^{24}) in measurement of local blood flow (ab), Robert Semple, et al, June, 919
- COLLOIDS**
- on regular and constant behavior pattern of flocculation test following roentgen irradiation in man (ab), Maki Takata, Feb., 324
 - radiation effects on man in space [including Takata reaction] (ab), Konrad Buettner, April, 633
- IODINE**
- role of erythrocyte in blood iodine transport using radio-iodine ^{131}I (ab), Joseph B. Boatman and Campbell Moses, Feb., 320

BLOOD—cont.

- plasma**
 - changes in composition of plasma of rat during acute radiation syndrome, and their partial mitigation by dibenamine and cortin (ab), Henry I. Kohn, March, 478
 - effect of immaturity, hypophysectomy and adrenalectomy upon changes in blood plasma of rat during acute radiation syndrome (ab), Henry I. Kohn, March, 479
 - effect of x-irradiation on erythropoiesis, plasma and cell volumes (ab), Jacob Furth, et al., Jan., 159
 - use of radiophosphorus in studies of glomerular permeability of plasma inorganic phosphate (ab), Philip Handler and David V. Cohn, Feb., 320

BLOOD PRESSURE

- treatment of hypertension (unsuccessful with roentgen irradiation of carotid sinus) (ab), D. Loos, May, 791

BLOOD VESSELS

- See also Aorta; Arteries; Cardiovascular System; Hip; Veins; etc.
- congenital vascular anomalies (ab), Acors W. Thompson and June C. Shafer, Feb., 309

BLOOM, ROSS, and PATTINSON, J. N.: Osteochondromatosis of the hip joint (ab), Jan., 150**BLOOR, BYRON M., WRENN, FRANK R., Jr., and HAYES, GEORGE J.: An experimental method for the evaluation of contrast media used in cerebral angiography (ab), May, 754****BLYSTAD, WILHELM. See ENGESET, ARNE****BLYTTON, T. A.: Mass radiography in the South Wales valleys (ab), Jan., 135****BOATMAN, JOSEPH B., and MOSES, CAMPBELL: Role of erythrocyte in blood iodine transport using radioiodine ¹³¹I (ab), Feb., 320****BODY SECTION ROENTGENOGRAPHY**

- in transverse plane in contrast to vertical: advantages and indications (ab), A. Gebauer, June, 912
- results of laminographic study of retroperitoneum (ab), Bruno Bonomini, Jan., 154
- second international course in stratigraphy, Genoa, Italy, May, 742
- transverse axial laminography with partial rotation of the patient (ab), Luigi Oliva, May, 787
- transverse tomogram of normal thorax: contribution to topographical anatomy in living man (ab), Alfred Gebauer, Jan., 130
- use of tomography in diagnosis of basilar impression (ab), Vladimir Gvozdanovic and Sergije Dogan, Jan., 129

BOCK, K.: Pelvic horns: congenital hereditary anomaly within the framework of a malformation syndrome (ab), April, 616**BOECKER, W.: The pathological picture of melorheostosis (Léri). Two cases (ab), Feb., 303****BOGIN, MAXWELL, and THURMOND, JAMES: Hemangioma with purpura, thrombocytopenia and erythrocytopenia (ab), April, 630****BOGOROCH, R. See GROSS, J.****BOLCK, F. See GROSCHOPFF, K.-W.****BOLTON, V. L. See GEEVER, E. F.****BONES**

- See also Cranio; Exostoses; Spine; Wrist; under names of bones
- effect on bone grafts of radioactive isotopes of phosphorus (ab), Richard T. Odell, et al., March, 477
- late complications following irradiation of pelvic viscera (ab), William C. White and Frederick W. Finn, May, 795
- physiology of osseous circulation (ab), J. Ducuing, Feb., 301
- radioautographic visualization of sulfur-35 disposition in articular cartilage and bone of suckling rats following injection of labeled sodium sulfate (ab), Dominic D. Dziwiatkowski, April, 632

atrophy

- Engelmann's disease (progressive diaphyseal hyperostosis); case (ab), William H. Gullledge and J. Warren White, June, 906

- osteoporosis, a review (ab), Paul W. Berner, April, 612

calcification. See Bones, infarction**cancer**

- anemia of cancer patients and its relation to metastases to bone marrow (ab), Shu Chu Shen and F. Homburger, Jan., 151
- osseous metastases of adenocarcinoma of thyroid (ab), Leonard Barnard, Feb., 317

diseases. See also Osteitis; Osteochondritis; Osteosclerosis; other headings under Bones

- actinomycosis, with special reference to infection of vertebral column (ab), V. Zachary Cope, April, 614
- fibrous dysplasia (ab), Paul Strassburger, et al., March, 460
- fibrous dysplasia and comparable conditions in the jaws (ab), Frank L. Ingram, June, 907
- Looser-Milkman syndrome; occurrence in case of idiopathic steatorrhea (ab), Christopher Strang, March, 461
- multiple spontaneous "pseudo-fractures" (Milkman's syndrome) (ab), Stanley Nowell, et al., June, 906
- polyostotic fibrous dysplasia associated with hyperthyroidism (ab), Maurice Yvetta and Paul Starr, Feb., 303
- roentgen diagnosis and differential diagnosis of fibrous dysplasias of skeletal system (ab), L. Psenner and F. Heckermann, Feb., 302

fractures. See Fractures**fragility**

- osteogenesis imperfecta, Douglas D. Gain and Donald E. Lawson, Feb., 221

growth

- cleidocranial dysostosis syndrome: case in Negro child exhibiting retarded growth (ab), Roland B. Scott and L. Otto Banks, March, 462
- dental roentgenologic manifestations of systemic disease, II. Developmental disturbances, Edward C. Stafne, April, 507
- growth of shaft of human radius and ulna during first two years of life (ab), Musa K. Ghantous, April, 610
- renal rickets simulating "metaphyseal dysostosis"; case (ab), G. M. Muller and H. A. Sissons, April, 613

infarction

- contribution to differential diagnosis of bone calcification, especially of bony infarct (ab), A. Jakob, Jan., 146

marrow. See also Bones, cancer

- modification of acute irradiation injury in mice and guinea-pigs by bone marrow injections, Egon Lorenz, Charles Congdon and Delta Uphoff, June, 863
- multiple myeloma complicating Paget's disease (ab), Robert J. Gross and Gabriel Velin, March, 460
- multiple myeloma without demonstrable bone lesions (ab), Robert S. Wallerstein, Feb., 304
- treatment of multiple myelomata with radioactive phosphorus (ab), E. Lindgren, et al., May, 793
- variations in roentgen appearance of skeletal system in myeloma, Saul Heiser and Joel J. Schwartzman, Feb., 178
- vertebral manifestations of malignant lymphoma, myeloid leukemia, and multiple myeloma (ab), Robert Maetz, Jr., March, 464

pathology

- bone dystrophy associated with muscular dystrophy (myopathy) (ab), D. W. Ashby, et al., May, 778
- Cooley's erythroblastic anemia; some skeletal findings in adolescents and young adults (ab), John Caffey, March, 460
- generalized torulosis with bone involvement (ab), Morris F. Wiener, March, 460
- hypervitaminosis A with infantile cortical hyperostosis (ab), Irving E. Rineberg and Robert J. Gross, May, 779
- infantile cortical hyperostoses (ab), John F. Bowser, April, 611
- infantile cortical hyperostoses (ab), Paul C. Colonna and B. A. Richardson, Jan., 147
- infantile cortical hyperostoses; atypical case (ab), Ian D. Kitchin, April, 611
- infantile cortical hyperostoses; report of case and summarization and evaluation of all other reported cases (ab), Leonard M. Rapoport, April, 611
- lead poisoning in children; 5 cases, with special reference to pica (ab), N. F. Elliott Burrows, et al., Feb., 305
- Maffucci's syndrome (dyschondroplasia with hemangiomas); case with early osseous changes (ab), J. Fred Mullins and Clarence S. Livingood, Feb., 304
- osseous lesions of tuberous sclerosis, John F. Holt and Willard W. Dickerson, Jan., 1
- osteonephropathy in children (ab), J. James Cancelmo and Ralph S. Bromer, May, 777
- roentgen findings in diagnosis and management of infantile scurvy; 3 cases (ab), Leonard S. Ellenbogen, et al., Jan., 147
- skeletal changes resembling scurvy in infantile hypothyroidism before and after thyroid therapy (ab), Arne Engeset, et al., May, 778
- vitamin A poisoning (ab), Donald Gribetz, et al., Feb., 304

roentgenography. See also Bones, diseases; Bones, pathology

- postgraduate course in roentgenographic interpretation of diseases of the bones and joints, Jan., 115
- radiology in bone pathology (ab), Joseph Hanelin and Laurence L. Robbins, June, 905

tumors

- experiences with benign tumors in pediatric practice, John W. Walker, May, 662
- extramedullary plasmacytoma; case (ab), Henry M. Lewis, et al., Feb., 314
- giant-cell tumors of tendon sheath origin; consideration of bone involvement; 2 cases with extensive destruction (ab), A. G. Fletcher, Jr. and Robert C. Horn, Jr., Feb., 307
- lymphogranulomatosis (ab), A. Vogt, May, 777
- management; some debatable problems (ab), Norman L. Higinbotham, March, 472
- multicentric osteogenic sarcoma in Paget's disease with cerebral extension (ab), Herbert Derman, et al., Jan., 146
- osteogenic sarcoma arising in traumatic hemithorax and hematoma of thoracic wall; case (ab), H. K. Staus, May, 776
- parosteal osteoma; new entity (ab), Charles F. Geschickter and Murray M. Copeland, May, 776
- studies of radiogallium as a diagnostic agent (ab), W. C. Mulry and H. C. Dudley, Jan., 158

BONOMINI, BRUNO: Some results of the laminographic study of retroperitoneum (ab), Jan., 154**BONSE, G.: X-ray findings in extensive angiomatous changes in the region of the right upper half of the body (ab), Jan., 147****BOOK REVIEWS**

- Atlas of Tumor Pathology, Jan., 118
- Bassi, Guido. La Malattia Sclerodermica, April, 587
- Dotter, Charles T., and Steinberg, Israel. Angiocardiography. Annals of Roentgenology, Vol. XX, May, 743
- Duran, Pierre. Diagnostic Encéphalographique. Encéphalogrammes Normaux et Pathologiques, Jan., 118

BOOK REVIEWS—cont.

- Ecker, Arthur. The Normal Cerebral Angiogram, Feb., 276
 Forestier, J. La Spondylarthrite Ankylosante. Clinique, Radiologie, Anatomie Pathologique, Traitement, April, 587
 Frimann-Dahl, J. Roentgen Examinations in Acute Abdominal Diseases, April, 586
 Gutmann, René-A. Les Syndromes Douloureux de la Région Épigastrique, May, 744
 Hodges, Fred J., Holt, John F., Jacox, Harold W., and Collins, Vincent P., editors. The 1951 Year Book of Radiology (June, 1950-June, 1951), May, 745
 Karsner, Howard T. Tumors of the Adrenal, Jan., 118
 Merck Index of Chemicals and Drugs. Encyclopedia for the Chemist, Pharmacist, Physician, and Allied Professions, April, 587
 Meschan, Isadore. An Atlas of Normal Radiographic Anatomy, Feb., 275
 Narath, Peter A. Renal Pelvis and Ureter, March, 431
 Potter, Edith L. Pathology of the Fetus and the Newborn, May, 743
 Pugh, David B. Roentgenologic Diagnosis of Diseases of Bones, May, 744
 Reese, Algernon B. Tumors of the Eye, March, 431
 Schinz, H. R., Baensch, W. E., Friedl, E., and Uehlinger, E. Roentgen-Diagnostics. Vol. I. Skeleton (English trans.), March, 430
 Schlimberger, Hans G. Tumors of the Mediastinum, Jan., 118
 Schmorl, Georg. Die gesunde und kranke Wirbelsäule im Röntgenbild und Klinik. Pathologisch-anatomische Untersuchungen, May, 744
 Schwartz, C. Wadsworth, and Collins, Lois Cowan. The Skull and Brain Roentgenologically Considered, May, 742
 Shurtleff, Forrest E. Children's Radiographic Technic, March, 430
 Steel, David. Roentgen Anatomy (Roentgen Anatomia), March, 432
 Stewart, Fred W. Tumors of the Breast, Jan., 118
 Stout, Arthur P. Tumors of the Peripheral Nervous System, Jan., 118
 Stumpf, Pleikart. Kymographische Röntgendiagnostik, March, 431
 Wahl, Arthur C., editor, and Bonner, Norman A., assistant editor. Radioactivity Applied to Chemistry, Jan., 117
 Weyl, Charles, and Warren, S. Reid, Jr. Radiologic Physics, Jan., 117
- BOOKS RECEIVED (not reviewed)**
 Actas del Tercer Congreso Interamericano de Radiología, Chile, 1949, March, 430
 Alexander, Hanna. Attelektasen der Lunge. Die verschiedenen Formen, ihre Entstehung und Bedeutung, March, 430
 Bull, H. Cecil H. X-Ray Interpretation, March, 429
 Cavalcanti da Silva Telles, Francisco. Pneumoperitônio Diagnóstico, June, 885
 Campbell, Hugh J., and Liberman, James B. Physicians Federal Income Tax Guide, March, 429
 Eleventh Semiannual Report of Atomic Energy Commission, January 1952, March, 429
 Esser, Claus. Topographische Ausdeutung der Bronchien im Röntgenbild, mit Berücksichtigung der neuzeitlichen Nomenklatur, Jan., 117
 Fairbank, Thomas. An Atlas of General Affections of the Skeleton, June, 885
 Gibson, H. L. The Photography of Patients, Including Discussions of Basic Photographic and Optical Principles, March, 429
 Graf, K. Geschwulste des Ohres und des Kleinhirnbrückenwinkels, May, 742
 Haenisch, G. F., and Holthausen, H. Einführung in die Röntgenologie, Feb., 275
 Holzmann, Max. Klinische Elektrokardiographie, March, 430
 Jönsson, Gunnar, Bröden, Bror, and Karnell, Johan. Thoracic Aortography, with Special Reference to Its Value in Patent Ductus Arteriosus and Coarctation of the Aorta, Acta radiol. Suppl. 89, March, 429
 Kepp, Richard Kurt. Grundlagen der Strahlentherapie: Physik, Biologie und allgemeine Therapie, May, 742
 Sack, Heinrich. Das Phäochromozytom, Feb., 275
 Schinz, H. R., Baensch, W. E., Friedl, E., and Uehlinger, E. Lehrbuch der Röntgendiagnostik, 5. Lieferung. Innere Organe, March, 430; 6. Lieferung. Innere Organe, May, 742
 Schoen, Herbert, editor. Medizinische Röntgentechnik, Jan., 117; June, 885
 Steindler, Arthur. Post-Graduate Lectures on Orthopedic Diagnosis and Indications. Section A. Tuberculosis of Skeletal System. Section B. Osteomyelitis, April, 586
 Taylor, Denis. The Measurement of Radio Isotopes, Feb., 275
 Willis, Henry Stuart, and Cummings, Martin Marc. Diagnostic and Experimental Methods in Tuberculosis, May, 742
- BOSHER, LEWIS H., Jr., and TAYLOR, FREDERICK H.:** Heterotopic gastric mucosa in the esophagus with ulceration and stricture formation (ab), Feb., 294
BOSWORTH, BOARDMAN M., and LANDAU, FREDERICK L.: Solitary diverticulum of the ascending colon; case diagnosed before operation (ab), March, 457
- BOSWORTH, EDWARD L.:** Generalized herpes zoster: report of a case following roentgen ray therapy, associated with chronic lymphatic leukemia, leukemia cutis and Mikulicz's syndrome (ab), April, 632
BOTHEN, NILS F.: Roentgen picture in cases of lung mycosis (ab), May, 761
BOTHWELL, T. H. See ALPER, T.
BOUCOT, KATHARINE R. See ROSEMOND, GEORGE P.
BOURONCLE, BERTHA A. See WISEMAN, BRUCE K.
BOUSLOG, JOHN S.: Country radiologist; presidential address, April, 556
BOWEL. See Intestines
BOWERS, JOHN Z.: Acute radiation syndrome. A problem for practitioners (ab), Jan., 159
BOWSER, JOHN F.: Infantile cortical hyperostoses (ab), April, 611
BOYDEN, EDWARD A.: Distribution of bronchi in gross anomalies of the right upper lobe, particularly lobes subdivided by the azygos vein and those containing pre-arterial bronchi, June, 797
— and HAMRE, C. J.: Analysis of variations in the bronchovascular patterns of the middle lobe in fifty dissected and twenty injected lungs (ab), Jan., 130
BRAAF, MURRAY M.: Migraine headache: an analysis of 124 cases treated by head-traction manipulation and thiamin chloride (ab), Feb., 305
BRADFORD, CHARLES H., and LARSEN, IVAR: Serrainfractures of the anterior lip of the os calcis (ab), May, 782
- BRAIN**
 See also Meninges; Pituitary Body
 —widening of septum pellucidum (ab), W. Zaunbauer, April, 597
abscess
 —paradoxical brain abscess in congenital heart disease (ab), Ira Cohen, et al, Feb., 285
 —syndrome of brain abscess with congenital cardiac disease; case with complete recovery (ab), Aaron J. Beller, Feb., 285
atrophy
 —encephalography in atrophy (ab), Erik Lindgren, March, 441
 —reversible cerebral atrophy (ab), William P. Williamson and Calvert J. Winter, Feb., 285
blood supply. See also Aneurysm; Brain, tumors; Thrombosis
 —cerebral angiography (ab), Frank H. Mayfield, et al, Jan., 128
 —collateral cerebral circulation as demonstrated by carotid angiography (ab), A. Torkildsen and K. Koppang, March, 441
 —demonstration of brain vessels with viscous Perabrodil M (35 per cent) (ab), K. Albrecht and W. Dressler, May, 734
 —experimental method for evaluation of contrast media used in angiography (ab), Byron M. Bloor, et al, May, 734
 —improved technic for percutaneous cerebral angiography; preliminary report (ab), Dan C. Donald, et al, March, 441
 —normal cerebral angiogram (ab), Robert W. Curry and George G. Culbreth, Feb., 284
 —ocular complications encountered in intracranial arteriography (ab), Harold F. Falls, et al, April, 598
 —rapid serial contrast angiography (ab), Charles T. Dotter and Israel Steinberg, June, 808
 —some examples of the diagnostic value of percutaneous carotid angiography (ab), Knut Koppang, Jan., 128
 —vertebral angiography by catheterization: new method employed in 221 cases (ab), Stig Radner, Jan., 128
calcification
 —importance of congenital toxoplasma infection for the etiologic x-ray diagnosis of organic defects of central nervous system (ab), Johannes Schoeps, Jan., 129
 —in track of needle following ventricular puncture (ab), Bengt Falk, March, 442
 —intracranial calcification following pneumococcal meningitis (ab), Abraham Levinson and Hans Hartenstein, March, 444
cancer
 —diiodrast studies of vertebral and cranial venous systems to show their probable role in cerebral metastases (ab), Robert Anderson, May, 735
cysts
 —colloid cyst of third ventricle (ab), Hugh Cairns and William H. Mosberg, Jr., April, 597
hemorrhage
 —cerebrovascular accidents: surgical management with particular reference to massive intracranial hemorrhage (ab), E. S. Gurdjian and J. E. Webster, April, 597
 —diagnosis of traumatic intracranial hemorrhage by angiography (ab), J. E. Webster, et al, May, 734
roentgenography. See also Brain, calcification; Brain, tumors; etc.
 —changes in cerebrospinal fluid after pneumoencephalography (ab), Edwin R. Bickerstaff, May, 735
 —deaths related to pneumoencephalography during 6 year period (ab), John R. Whittier, March, 442
 —early changes in cerebrum and dysplasia of base of skull (ab), K. H. Schiffer, June, 802
 —technic of pneumoencephalography in children: comparative results with air and oxygen injection (ab), Louis Casamajor, et al, Feb., 284
 —value of appearance of ventricle in the encephalogram (ab), K. H. Schiffer, June, 802

BRAIN—cont.

- tumors**
 - evaluation of technic and results of radioactive di-iodo-fluorescein test for localization of intracranial lesions (ab), Moses Ashkenazy, et al, March, 442
 - in children, Arthur B. Smith, May, 688
 - intracranial tumors simulating vascular lesions: preliminary report (ab), David Hartson, March, 443
 - localization with radioactive derivatives of fluorescein: physical limitations (ab), E. H. Belcher and H. D. Evans, April, 598
 - multicentric osteogenic sarcoma in Paget's disease with cerebral extension (ab), Herbert Derman, et al, Jan., 146
 - place of radiation in treatment of intracranial tumors (ab), H. Dabney Kerr, March, 471
 - some preliminary clinical observations on use of radioactive isotopes for localization (ab), Jan G. deWinter, April, 598
 - Sturge-Weber syndrome: radiographic findings in 14 cases (ab), Giovanni Di Chiro and Erik Lindgren, April, 598
 - suprasellar (Rathke's pouch) cyst: unusual case simulating successively rheumatic fever, encephalitis, and brain-stem tumor: prolonged postoperative recovery and development of pubertas precox (ab), Alexander C. Johnson and John M. Meredith, Feb., 284
 - tumor with normal air encephalography and arteriography: unusual case (ab), W. Blackwood, et al, March, 443

BRANDENBURG, FREDERICK H. See **WARREN, KENNETH W.**

BRANDES, ROBERT W. See **McELIN, THOMAS W.**

BRANDT, EUGENIA L. See **GRIFFIN, A. CLARK**

BRAUER, W.: Melorheostosis: forme fruste (ab), April, 612

BREAST

- See also Tumors, experimental cancer
 - histologic changes in irradiated carcinoma (ab), I. G. Williams and G. J. Cunningham, Feb., 312
 - irradiation of normal human hypophysis in malignancy: 3 cases receiving 8,100-10,100 r tissue dose to pituitary gland (ab), Keith H. Kelly, et al, Feb., 311
 - tracer studies of radioactive sodium estrone sulfate (S^{38}) in cases of advanced cancer (ab), Edward F. Lewison, et al, April, 631

BRECKHOFF, K.: Contribution to the x-ray diagnosis of aneurysm of the ascending aorta (ab), Jan., 138

Thorotrast in the kidney eleven years after pyelography (ab), April, 619

BREMNER, A. E., and WARRICK, K. K.: Fractures of the calcaneus (ab), March, 465

BRENDZE, ROBERT, and PROVENZANA, R. WILLIAM: Congenital ureteral dilatation with renal hyperparathyroidism (ab), May, 785

BRET, J. See **PAPILLON, J.**

BRETT, M. S.: Advanced actinomycosis of the spine treated with penicillin and streptomycin: report of a case (ab), April, 614

BRIGGS, JOHN F.: Suggestions for the diagnostic study of a patient with an abnormal x-ray shadow of the chest (ab), June, 893

BRILHART, KENNETH B., and PRIESTLEY, JAMES T.: Pseudocysts of the pancreas (ab), Jan., 143

BRINEY, ALLAN K., and HODES, PHILIP J.: Urinary incontinence in women: roentgen manifestations, Jan., 109

BROADBENT, THOMAS R., and KERMAN, HERBERT D.: One hundred cases of carcinoma of the pancreas. A clinical and roentgenologic analysis (ab), Feb., 299

BROCHER, J. E. W.: Dysplasia of the vertebra (a study of the pathogenesis of spondylolisthesis) (ab), Jan., 148

BRODÉN, BROR. See **JÖNSSON, GUNNAR**

BRODWIN, HENRY A. See **BERNSTEIN, ARTHUR**

BROMER, RALPH S. See **CANCELMO, J. JAMES**

BRONCHI

- See also Bronchiectasis
 - analysis of variations in bronchovascular patterns of middle lobe in 50 dissected and 20 injected lungs (ab), E. A. Boyden and C. J. Hamre, Jan., 130
 - clinical physiology of human bronchi. Effect of vagus section on cough reflex, bronchial caliber, and clearance of bronchial secretions (ab), Karl P. Klassen, et al, March, 445
 - distribution of bronchi in gross anomalies of right upper lobe particularly lobes subdivided by azygos vein and those containing pre-apertural bronchi, Edward A. Boyden, June, 797
 - generalized softening in tracheobronchial system (ab), R. Pohl, Jan., 134
 - new roentgen sign of broncho-extrapleural perforation in lucite plumbage (ab), Allen Hurst and Morris A. Levine, June, 894
 - pathologic picture of bronchial insufficiency: contribution to active behavior of lungs in respiration (ab), K. Heckmann, Jan., 131
- cancer.** See also Lungs, cancer
 - beam-directed high-dosage radiotherapy of carcinoma, Leland R. Felton, Jan., 43
 - bronchogenic carcinoma as a differential diagnostic problem in pulmonary disease. Peripheral type: carcinoma arising from minor bronchi and bronchioles (ab), John H. Moyer and Alfred J. Ackerman, Feb., 288
 - bronchogenic carcinoma masked by pulmonary tuberculosis: case (ab), J. R. Phillips and J. W. Morrison, Jan., 132
 - bronchogenic carcinoma masquerading as other diseases: review of 200 cases (ab), J. K. Poppe, June, 895

—carcinoma on a background of chronic inflammation (ab), Bernhard Mangelsdorf, Feb., 289

—early detection of bronchogenic carcinoma (ab), Donald L. Paulson and Robert R. Shaw, May, 763

—esophagus and mediastinal lymphadenopathy in bronchial carcinoma, Felix G. Fleischner, Jan., 48

—value of bronchologic information in the diagnosis: indications for bronchoscopy (ab), J.-P. Tailleur, June, 895

cysts

—bronchogenic cysts: 2 cases (ab), Elmer C. Rigby and Phillip L. Rossman, May, 762

roentgenography. See also Bronchi, cancer

—advantages of a water-soluble iodine compound in bronchography (ab), Piero Gambaccini, June, 893

—bronchographic study of dyspnea (ab), P. L. Martin, May, 758

—bronchography with Métras' catheters (ab), Björn E. W. Nordenström and Uno A. T. Norlin, March, 445

—clinical and experimental studies in use of a water-soluble agent for bronchography (ab), Mordant E. Peck, et al, April, 600

—delayed pulmonary complications (ab), Philip W. Robertson and K. D. Forgan Morie, Jan., 131

—does ioduron bronchography damage the lung parenchyma? Contribution to pathogenesis of granulomatous changes and xanthomatous and interstitial pneumonia in primary lung processes (ab), Hans U. Zollinger, May, 758

—exploration of pulmonary cavities by water-soluble contrast media for bronchography (ab), P. Oudet, Feb., 287

—in children (ab), Eduardo Rivero, Jan., 131

—in tuberculosis (ab), G. Ibers, et al, May, 757

—lipiodol vs. water-soluble media for bronchography (ab), H. Métras, et al, Feb., 287

—methocel-diodrast: a viscous water-soluble contrast medium for bronchography. Roentgen and clinical results in 23 cases, Emanuel Salzman, Mordant E. Peck and A. J. Neerken, Feb., 289

—stereoscopic roentgen study regarding the influence of goiter on anatomy and topography of the tracheobronchial tree (ab), H. Brückner, Feb., 287

—total left pulmonary atelectasis after bronchography (ab), K. Reinhardt, April, 600

stricture. See Tuberculosis, Pulmonary

tumors

—adenoma in supernumerary tracheal lobe: unusual case (ab), Isaac Epstein, March, 448

—contributions to pathological picture of adenoma (ab), H. Finke, May, 763

BRONCHIECTASIS

—bronchiectatic bronchiolitis (ab), A. Omodei Zorini and Luigi Pigorini, May, 765

—pulmonary artery in bronchiectasis (ab), Walter G. Gobbel, Jr., et al, March, 451

—segmental distribution of shrinkage of parts of the lungs, with bronchiectasis formation (ab), Paul Ch. Schmid, Jan., 133

BRONCHIOLITIS. See Bronchiectasis

BRONCHOGRAPHY. See Bronchi, roentgenography

BROWN, MORTON G.: Acute benign pericarditis (ab), May, 767

BROWN, N. M., CASWELL, L. A., MILLER, A., and MATHEWS, W. H.: Effect of Ioduron B on the respiratory tree of guinea pigs (ab), April, 622

BROWN, REYNOLD F. See **KELLY, KEITH H.**

BROWN, ROBERT B., and ROSS, DONALD.: Congenital abnormalities of intestinal rotation and mesenteric attachment—cause of intestinal obstruction in the adult (ab), May, 770

BRÜCKNER, H.: A stereoscopic roentgen study regarding the influence of goiter on the anatomy and topography of the tracheobronchial tree (ab), Feb., 287

BRÜGGER, H.: Exacerbation of calcified lymph nodes of the neck and its roentgen identification (ab), June, 893

BRUNER, H. D., CLARK, JOHN K., and BARKER, HAROLD G.: An attempt to measure renal circulation time with Pit (ab), Feb., 319

BRUNNER, A.: Lung cancer (ab), June, 894

BRUNSCHWIG, ALEXANDER.: Possibilities of radical surgery in cancer of the cervix uteri recurrent after radiation therapy (ab), April, 628

BUCHTALA, VICTOR.: Centrally caused edema of the lung (ab), Jan., 134

BUCKLER, ARTHUR. See **BIBER, DAVID**

BÜCHNER, H.: Orthodiametry (ab), April, 605

BÜCKER, J., and FEINDT, H. R.: Pseudopolypoid lymphatic ilei (pseudo-ileitis) (ab), Jan., 143

BÜLL, H.-J. See **GROSKOPF, K.-W.**

BUETTI, C.: Demonstration of the atlanto-epitrochlear joints and the transverse processes of the atlas and second cervical vertebra (ab), April, 622

BUETTNER, KONRAD.: Radiation effects on man in space (including Takata reaction) (ab), April, 633

BULLET WOUNDS. See Wounds

BURROWS, N. F., ELLIOTT, RENDLE-SHORT, JOHN, and HANNA, DEBS.: Lead poisoning in children. Report of five cases, with special reference to pica (ab), Feb., 305

BYRD, BENJAMIN F., Jr.: Gastrojejunocolic fistula following vagotomy for marginal ulcer (ab), March, 456

BYRNE, JOHN E., and MELICK, WILLIAM F.: Subcutaneous urography: description of a new method utilizing 70% urokon and hyaluronidase (a preliminary report) (ab), March, 466

C

- CAFFEY, JOHN:** Cooley's erythroblastic anemia: some skeletal findings in adolescents and young adults (ab), March, 460
- CAHAN, WILLIAM G.** See **MARTIN, HAYES**
- CAIRNS, HUGH, and MOSBERG, WILLIAM H., Jr.:** Colloid cyst of the third ventricle (ab), April, 597
- CALCANIUM**
- fractures (ab), A. E. Bremner and C. K. Warrick, March, 465
 - fractures of anterior process (ab), Moses Gellman, March, 466
 - sprain-fractures of anterior lip of os calcis (ab), Charles H. Bradford and Ivar Larsen, May, 782
- CALCIFICATION.** See Abdomen; Bones; Heart; Joints; Lungs; Lymph Nodes; Pancreas; etc.
- CALCINOSIS.** See Kidneys
- CALCULI.** See Appendix; Bladder; Gallbladder; Kidneys
- CALDWELL, MILTON V.** See **CULVER, GORDON J.**
- CALIHAN, ROBERT J.:** Anterior sacral meningocele, Jan., 104
- CALLAWAY, J. LAMAR, and KERBY, GRACE P.:** Splanchnic removal of bacteria from the circulating blood of irradiated rabbits (ab), Jan., 160
- CALENDINE, GEORGE W., Jr.** See **MORTON, JOSEPH L.**
- CALVY, GEORGE L., and DUNDON, CARROLL C.:** Roentgen manifestations of acute intermittent porphyria, Feb., 204
- CAMPBELL, C. GORDON.** See **SPOHN, PETER H.**
- CAMPBELL, WILLIAM:** Tumors of the jaw (ab), April, 599
- CANCELMO, J. JAMES, and BROMER, RALPH S.:** Osteonephropathy in children (ab), May, 777
- CANCER**
- See also under names of organs: Tumors, experimental
 - anemia of cancer patients and its relation to metastases to bone marrow (ab), Shu Chu Shen and F. Homburger, Jan., 151
 - cancer symposium, University of Texas, March, 420
 - malignant disease in childhood (ab), Cecil G. Teall, June, 911
 - radioactive cobalt as adjunct to cancer surgery (ab), Arthur G. James, et al., May, 794
 - radioactive isotopes and malignancy (ab), Richard H. Chamberlain, May, 792
 - uses of radioactive gold colloid in therapy and palliation of neoplastic disease (ab), William N. Harsha, June, 919
- metastases.** See also Bones, cancer; Lungs, cancer; Lymph Nodes
- diadram studies of vertebral and cranial venous systems to show their probable role in cerebral metastases (ab), Robert Anderson, May, 755
 - metastizing adenoma of thyroid (ab), H. Fetzer, May, 790
 - primary carcinoma of female urethra with metastases (ab), J. S. Eisenstaedt, May, 790
- radiotherapy**
- betatron cancer therapy, Roger A. Harvey, Lewis L. Haas, and John S. Laughlin, Jan., 23
 - clinical experience with irradiation through a grid, Hirsch Marks, March, 338
 - irradiation of normal human hypophysis in malignancy: 3 cases receiving 8,100-10,100 r tissue dose to pituitary gland (ab), Keith H. Kelly, et al., Feb., 311
 - late sequelae following cancericidal irradiation in children: 3 cases, Walter T. Murphy and David L. Berens, Jan., 35
 - planning technic for roentgen treatment of carcinoma of esophagus and other deep-seated tumors (ab), Olov Dahl, March, 472
 - recent clinical experience with grid in x-ray treatment of advanced cancer: preliminary report, William Harris, March, 343
- CANNON, ABRAM H.** See **O'CONNOR, VINCENT J.**
- CANNON, R. O.** See **HAHN, P. F.**
- CANTOR, MEYER O.:** Mercury lost in the gastrointestinal tract. Report of an unusual case (ab), May, 768
- CARBON, RADIOACTIVE.** See Radioactivity
- CARDIOSPASM.** See Stomach
- CARDIOVASCULAR SYSTEM**
- See also Aorta; Coronary Vessels; Heart; etc.
 - angiocardigraphic findings in pulmonary tuberculosis (ab), Israel Steinberg, et al., April, 602
 - angiocardigraphy (ab), Charles T. Dotter and Israel Steinberg, June, 897
 - angiocardigraphy (ab), Mostyn L. Powell and Henry G. Hiller, June, 898
 - angiocardigraphy in congenital heart disease of cyanotic type. III. Observations on complete transposition of great vessels. R. N. Cooley and R. D. Sloan, April, 481
 - diagnostic value of dynamic studies in angiocardigraphy: evaluation of new rapid technic (ab), T. F. Keyes, et al., Jan., 137
 - effect of angiocardigraphy on heart as measured by electrocardiographic alterations (ab), Willard J. Zinn, et al., April, 604
 - electrocardiographic changes during angiocardigraphy (ab), Eugene I. Horger, et al., March, 452
 - heart puncture in man for diadram visualization of ventricular chambers and great arteries. Its experimental and anatomophysiological bases and technic (ab), Elmo R. Ponsdomenech and Virgilio B. Núñez, March, 452
 - rapid serial contrast angiography (ab), Charles T. Dotter and Israel Steinberg, June, 908
 - roentgenologic diagnosis of congenital malformations (ab), David M. Gould, April, 604
 - stenosis of isthmus of aorta: roentgenkymographic studies of normal and diseased hearts, the great vessels, and transmitted pulsations (ab), Alfred Vogt, Jan., 138
- CARNEGIE, D. M.:** Angiocardigraphy in congenital heart disease. Anaesthesia and technique (ab), May, 766
- CARNWATH, JOHN W.** See **FRED, JOHN H.**
- CAROTERS, E. L.** See **HAHN, P. F.**
- CAROTID BODY**
- angiographical diagnosis of tumors (ab), Hans Idbohrn, Jan., 128
 - tumor of carotid body type presumably arising from glomus jugularis (ab), James L. Poppen and P. A. Riemen-schneider, Feb., 286
- CAROTID SINUS**
- treatment of hypertension (unsuccessful, with roentgen irradiation of carotid sinus) (ab), D. Loos, May, 791
- CARPUS.** See Scaphoid Bone, Carpal; Wrist
- CARRIGAN, FRANCIS P.** See **DOWNING, DANIEL F.**
- CARTER, R. FRANKLIN, and GILLETTE, LEE:** Benign stricture of the intrahepatic bile ducts (ab), Jan., 145
- CARTER, RAY A.** See **JACOBSON, GEORGE**
- CARTILAGE**
- radioautographic visualization of sulfur-35 disposition in articular cartilage and bone of suckling rats following injection of labeled sodium sulfate (ab), Dominic D. Dzielatowski, April, 632
- CASAMAJOR, LOUIS, LAIDLAW, ROBERT W., and KOZINN, PHILIP J.:** Technique of pneumoencephalography in children: comparative results with air and oxygen injection (ab), Feb., 284
- CASEY, ERNEST R., Jr.** See **MCKIBBEN, BYRON G.**
- CASSEL, CHESTER, RUFFIN, JULIAN M., REEVES, ROBERT J., and STODDARD, LELAND D.:** Late effects of thorium dioxide in man (ab), May, 788
- CASSEN, BENEDICT.** See **ALLEN, HERBERT C., Jr.**
- CASWELL, L. A.** See **BROWN, N. M.**
- CASWELL, RANDOLPH.** See **CATON, WILLIAM L.**
- CATARACTS**
- calcareous cataract in x-ray picture (ab), E. Vogler, Jan., 130
 - experimental radiation cataracts. I. Cataracts in rabbit following single x-ray exposure (ab), David G. Cogan and David D. Donaldson, April, 634
- CATHETERIZATION.** See Aorta; Heart
- CATON, WILLIAM L., ROBY, CHARLES C., REID, DUNCAN E., CASWELL, RANDOLPH, MALETSKOS, C. J., FLUHARTY, REX G., and GIBSON, JOHN G., II.:** Circulating red cell volume and body hematocrit in normal pregnancy and the puerperium by direct measurement, using radioactive red cells (ab), April, 631
- CAUDA EQUINA.** See Spinal Cord
- CEBALLOS, JORGE, and ISAZA B., JAIRO:** Determination of individual enlargement of the ventricles. Method based on angiocardigraphy in the left anterior oblique position, June, 844
- CECUM**
- See also Intestines
 - roentgen diagnosis of ceco-colic tumor invagination (ab), H. Garbsch and B. Thurnher, Feb., 297
 - roentgen features of non-malignant periappendiceal and ileocecal lesions (ab), Charles Gottlieb, et al., Feb., 297
- CELLERIER.** See **PRUVOST, P.**
- CELLS**
- differential effects of roentgen rays on cell permeability and on cell cleavage. Experiments with egg cells of *Arbacia punctulata* (ab), Balduin Lucké, et al., Feb., 323
- CEPHALOMETRY.** See Craniometry
- CEREBROSPINAL FLUID**
- changes in fluid after pneumoencephalography (ab), Edwin R. Bickerstaff, May, 755
 - tracer studies with radioactive phosphorus (³²P) on absorption of cerebrospinal fluid and problem of hydrocephalus (ab), John E. Adams, March, 477
- CEREBRUM.** See Brain
- CHAFFIN, LAWRENCE.** See **SNYDER, WILLIAM H., Jr.**
- CHAMBERLAIN, RICHARD H.,** appointed to editorial staff of *Radiology*, April, 584
- CHAMBERLAIN, RICHARD H.:** Radioactive isotopes and malignancy (ab), May, 792
- See **WOLFERTH, CHARLES C.**
- CHAMBERS, F. W., Jr.** See **BARROW, JACK**
- CHAMBERS, JOHN S., Jr.:** Tuberculous cavities of the lower lobe. Results of treatment in 103 patients (ab), April, 601
- CHAPMAN, SAM B.:** Radiologic diagnosis of respiratory lesions in children, May, 705
- CHAPPLE, C. F.:** Appendicular calculi. Report of two cases and a brief review of the literature (ab), March, 458
- CHARPIN, J.** See **MÉTRAS, H.**
- CHAVES, AARON D.** See **ABELES, HANS**
- CHEMOTHERAPY.** See Hodgkin's Disease
- CHEST.** See Thorax
- CHILDREN**
- See also Bones, growth; Bones, pathology; Heart, abnormalities; Infants, Newborn; Intussusception; Kidneys, tumors; Scurvy; Stomach, foreign bodies
 - aneurysm of cardiac apex in a child (ab), J. Papillon, et al., May, 767
 - brain tumors, Arthur B. Smith, May, 688
 - bronchography (ab), Eduardo Rivero, Jan., 131
 - congenital pulmonary stenosis: postoperative observations on 214 children (ab), C. R. Leininger, et al., March, 448

CHILDREN—cont.

- dental roentgenologic manifestations of systemic disease. II. Developmental disturbances, Edward C. Stafne, April, 507
- determination of the sodium²⁴ "space" in infants, children, and adults (ab), Anne Perley, et al, Feb., 318
- device for immobilizing children during radiographic examinations, Earl R. Miller, March, 421
- ectopic ureter in childhood, with account of 4 personal cases (ab), A. J. Aldred and T. T. Higgins, March, 467
- experiences with benign bone tumors in pediatric practice, John W. Walker, May, 662
- fractures of neck of femur in children; a clinical study (ab), Guillermo Allende and Luis G. Lezama, March, 465
- intra-abdominal calcification in an infant; case (ab), Nathan Epstein and Joseph A. Ritter, Feb., 300
- late sequelae following cancericidal irradiation in children; 3 cases, Walter T. Murphy and David L. Berens, Jan., 35
- lead poisoning; 5 cases, with special reference to pica (ab), N. F. Elliott Burrows, et al, Feb., 305
- lesions of the upper gastro-intestinal tract in infants and children, Vernon M. Lockard, May, 696
- malignant disease in childhood (ab), Cecil G. Teall, June, 911
- osteonephropathy (ab), J. James Cancelmo and Ralph S. Bromer, May, 777
- persistent vomiting due to cardio-esophageal relaxation in infancy (ab), Peter H. Spohn and C. Gordon Campbell, Jan., 140
- radiographic diagnosis of hydrocolpos in infants, Louis L. Klostermeyer and John J. Thompson, Jan., 100
- radiologic diagnosis of respiratory lesions in children, Sam B. Chapman, May, 705
- retroperitoneal tumors in infants and children; 88 cases (ab), William H. Snyder, Jr., et al, June, 911
- roentgen pattern of infantile spine (ab), R. Seyss, May, 781
- roentgen therapy in lymphadenitis and sinusitis in childhood, with 10-year follow-up of 349 cases (ab), Harold Levy, June, 916
- role of radiation therapy in pediatrics (ab), Paul H. Reitman, May, 792
- spinal tumors diagnosed during first year of life; case (ab), William H. Mosberg, Jr., Feb., 306
- technic of pneumoencephalography: comparative results with air and oxygen injection (ab), Louis Casamajor, et al, Feb., 284
- urologic problems in pediatric x-ray diagnosis, Frederic N. Silverman, March, 325
- CHOLANGIOGRAPHY.** See Bile Ducts; Biliary Tract
- CHOLECYSTECTOMY.** See Gallbladder
- CHOLECYSTOGRAPHY.** See Gallbladder
- CHONDRODYSPLASIA CALCIFICANS CONGENITA.** See Achondroplasia
- CHONDROMA.** See Tumors, chondroma
- CHONDROMALACIA.** See Spine
- CHOUKÉ, KEHAR S., and HODES, PHILIP J.:** The pterygoid bar and its recognition by roentgen methods in trigeminal neuralgia (ab), Jan., 130
- CHRISTIE, G. S.:** Diaphragmatic deformation of the liver (ab), April, 610
- CHRISTIE, JAMES H.** See KOLETSKY, SIMON
- CHRISTIE, RONALD V.** See KNOTT, J. M. S.
- CHU, C. S., HSIAO, S. C., and CHU, T. T.:** Rhinoscleroma. Report of a case (ab), April, 630
- CHU, T. T.** See CHU, C. S.
- CHYLE**
 - reflux of intestinal chyle in lymphatics of the leg (ab), Servelle and Deysson, Jan., 154
- CHYLOTHORAX**
 - traumatic chylothorax: roentgen aspects (ab), Robert M. Lowman, et al, March, 450
- CICATRIX**
 - treatment of certain postoperative cicatrices, particularly those following plastic surgery: use of roentgen and radium rays (ab), E. Daubresse, March, 476
- CIRCULATION.** See Blood; Bones; Kidneys
- CLAGETT, O. THERON.** See HODGSON, CORRIN H.
- CLARK, JOHN K.** See BRUNER, H. D.
- CLARK, P. LEMON, III.** See JACKMAN, RAYMOND J.
- CLAVICLE**
 - cleidocranial dysostosis syndrome; case in Negro child exhibiting retarded growth (ab), Roland B. Scott and L. Otto Banks, March, 462
- CLEVELAND, HENRY C.:** Intussusception in infancy and childhood (ab), March, 457
- COBALT, RADIOACTIVE.** See Radioactivity
- COCCIDIOIDOMYCOSIS**
 - pulmonary mycoses—coccidioidomycosis and pulmonary cavitation; study of 92 cases (ab), William A. Winn, Feb., 290
- COELLO, ALFRED J.:** Observations on division of adhesions in opaque lobes (ab), Jan., 133
- COGAN, DAVID G., and DONALDSON, DAVID D.:** Experimental radiation cataracts. I. Cataracts in the rabbit following single x-ray exposure (ab), April, 634
- COHEN, ABRAHAM F., and GEFFEN, ABRAHAM:** Roentgenographic methods in pulmonary disease (ab), Feb., 287
- COHEN, IRA, BERGMAN, PHILIP S., and MALIS, LEONARD:** Paradoxical brain abscess in congenital heart disease (ab), Feb., 285
- COHN, DAVID V.** See HANDLER, PHILIP
- COLE, J. O. Y.:** Distortion and displacement of the renal pelvis and calices by extrarenal lesions (ab), March, 467
- COLON**
 - See also Fistula; Intestines
 - cancer**
 - diagnosis of early cancer of large bowel and rectum (ab), Norman A. McCormick, April, 607
 - roentgenologic examination of colon using drainage and negative pressure, with special reference to early diagnosis of neoplasm (ab), F. E. Templeton and E. A. Addington, Feb., 297
 - dilatation**
 - megacolon and dilatation of small bowel in parkinsonism (ab), Alexander Lewitan, et al, March, 458
 - diverticula.** See Intestines
 - tumors**
 - diffuse familial polyposis (ab), Charles W. Mayo, et al, June, 903
 - roentgen diagnosis of ceco-colic tumor invagination (ab), H. Garbsch and B. Thurnher, Feb., 297
- COLONNA, PAUL C., and RICHARDSON, B. A.:** Infantile cortical hyperostoses (ab), Jan., 147
- CONARD, ROBERT A.:** Effect of x-irradiation on intestinal motility of the rat (ab), April, 633
- CONCRETE**
 - absorption of 2-mev constant potential roentgen rays by lead and concrete, W. W. Evans, R. C. Granke, K. A. Wright, and J. G. Trump, April, 560
- CONGDON, CHARLES.** See LORENZ, EGON
- CONROY, CONDE R., and WOELFEL, GEORGE F.:** Annular pancreas. Report of two cases (ab), May, 774
- CONTRAST MEDIA**
 - See also Aorta; Barium; Brain, blood supply; Bronchi, roentgenography; etc.
 - results of an inquiry into accidents following intravenous injection of contrast media for examination of urinary system (ab), Jean De Backer, June, 913
- COOKE, FRANCIS N., EVANS, JOHN M., KISTIN, ALBERT D., and BLADES, BRIAN:** An anomaly of the pulmonary veins: a case study (ab), March, 450
- COOLEY, R. N., and SLOAN, R. D.:** Angiocardiography in congenital heart disease of cyanotic type. III. Observations on complete transposition of the great vessels, April, 481
- COOLEY'S ANEMIA.** See Anemia, erythroblastic
- COONEY, JAMES P.:** Medical problems in atomic warfare (ab), Jan., 159
- Physician's problem in atomic warfare (ab), March, 480
- COPE, V. ZACHARY:** Actinomycosis of bone with special reference to infection of the vertebral column (ab), April, 614
- COPELAND, MURRAY M.** See GESCHICKTER, CHARLES F.
- COPPEDGE, THOMAS O.** See ANDREWS, J. ROBERT
- COPPRIDGE, WILLIAM M., ROBERTS, LOUIS C., and CULP, DAVID A.:** Pyelographic deformity produced by a hepatic abscess (ab), April, 621
- COQUELET, OCT.:** Some aspects of the physiopathology of the articulations (ab), Feb., 301
- COR PULMONALE.** See Heart
- CORCORAN, DAVID B., and WALLACE, K. K.:** Prolapsing gastric mucosa (ab), Jan., 141
- CORONARY SINUS.** See Heart
- CORONARY VESSELS**
 - calcification of aortic valve and of coronary arteries (ab), David Pyke and Cecil Symons, June, 900
 - visualization of the coronary arteries during life (ab), James A. Helmsworth, et al, Jan., 137
- CORSCADEN, JAMES A.:** Sarcoma of the endometrium (ab), March, 473
- CORTIN.** See Adrenal Preparations
- CORTISONE.** See Adrenal Preparations
- COSTLOW, WILLIAM E.:** Radiation therapy in diseases of the genito-urinary tract (ab), June, 915
- and **NOLAN, JAMES F.:** Factors influencing prognosis in the treatment of carcinoma of the cervix uteri (ab), Feb., 313
- COUGH**
 - clinical physiology of human bronchi. Effect of vagus section on cough reflex, bronchial caliber, and clearance of bronchial secretions (ab), Karl P. Klassen, et al, March, 445
- COUNSELLER, VIRGIL S.** See THOMPSON, GERSHOM J.
- COUNTERS**
 - accurate method for measurement of radioiodine in thyroid gland by external counter, Theodore Fields and George V. LeRoy, Jan., 57
 - scintillation counter as instrument for in vivo determination of thyroid weight, Herbert C. Allen, Jr., and William E. Goodwin, Jan., 68
 - scintillation counter in clinical studies of human thyroid physiology using I¹³¹ (ab), Herbert C. Allen, Jr., et al, April, 631
- COURY, JOHN J.** See BENSON, CLIFFORD D.
- COWING, RUSSELL F.** See FOGG, LLOYD C.
- COXA PLANA.** See Osteochondritis
- CRANIOLACUNIA.** See Cranium
- CRANIOMETRY**
 - Cave's roentgenographic method of fetal cephalometry; preliminary evaluation (ab), Thomas W. McElin, Feb., 307

CRANIUM

- cleidocranial dysostosis syndrome; case in Negro child exhibiting retarded growth (ab), Roland B. Scott and L. Otto Banks, March, 462
- craniofacial diagnosed prenatally; review of literature with case report (ab), Generoso d'Aversa and Dudley H. Lonnegren, March, 444
- early changes in cerebrum and dysplasia of base of skull (ab), K. H. Schiffer, June, 892
- fibrous dysplasia (ab), William W. Feiring, et al, May, 779
- melorheostosis with bone sclerosis in right upper quadrant of body, involvement of skull, and skin changes (ab), W. Hoffman and G. Heim, Feb., 303
- osteoporosis circumscripta (ab), G. E. Vilvandrè, Jan., 129
- pterygo-alar bar and its recognition by roentgen methods in trigeminal neuralgia (ab), Kehar S. Choukè and Philip J. Hodes, Jan., 130
- CRILE, GEORGE, Jr.: Treatment of tumors of the thyroid with divided doses of radioactive iodine (ab), Feb., 317
- and McCullagh, E. PERRY: Treatment of hyperthyroidism: an evaluation of thyroidectomy, of prolonged administration of propyl thiouracil, and of radioactive iodine (ab), June, 918
- CROWE, ALDRICH C. See ELLENBOGEN, LEONARD S. CUBITUS VARUS. See Elbow
- CULBRETH, GEORGE G. See CURRY, ROBERT W.
- CULP, DAVID A. See COPPRIDGE, WILLIAM M.
- CULVER, GORDON J., and CALDWELL, MILTON V.: Endometriosis of the recto-sigmoid (ab), Feb., 298
- CUNNINGHAM, G. J. See WILLIAMS, I. G.
- CUNNINGHAM, LEW. See GRIFFIN, A. CLARK
- CURRY, ROBERT W., and CULBRETH, GEORGE G.: The normal cerebral angiogram (ab), Feb., 284
- CURTIS, GEORGE M. See KLASSEN, KARL P.
- CUTLER, CONDUCT W., Jr. See LIKELY, DAVID S.
- CYSTINE
- radiopaque renal calculus identified as cystine by x-ray diffraction, Jonathan Parsons, June, 878
- CYSTS. See Brain; Intestines; Kidneys; Lungs; Pancreas

D

DACRYOCYSTITIS

- chronic dacryocystitis; rhinological aspects (ab), Francis H. McGovern, May, 756
- DAHL, ODD: Supravoltage technique and engineering (ab), April, 623
- DAHL, OLOV: Planning technique for roentgen treatment of carcinoma of the oesophagus and other deep-seated tumours (ab), March, 472
- DALAND, ERNEST M.: Radiation damage to normal tissues in the diagnosis and treatment of nonmalignant conditions and its surgical repair (ab), May, 794
- DANIEL, ROLLIN A., Jr. See DIVELEY, WALTER
- DARBY, W. J. See HAHN, P. F.
- DAUBRESSE, E.: Concerning the treatment of certain post-operative cicatrices, particularly those following plastic surgery. Use of roentgen and radium rays (ab), March, 476
- DAUGHADAY, WILLIAM H. See SWEENEY, BERNARD J.
- DAUMET, PH., and LE MELLETIER, J.: Lobar emphysema simulating a giant emphysematous bulla (ab), April, 603
- d'AVERSA, GENEROSO, and LONNGREN, DUDLEY H.: Craniofacial diagnosed prenatally. Review of literature with a case report (ab), March, 444
- DAVIDOFF, LEO M. See EPSTEIN, JOSEPH A.
- See FEIRING, WILLIAM W.
- DAVIS, LOYAL. See ASHKENAZY, MOSES
- DAWSON, R. See WEBSTER, J. E.
- DEAN, ARCHIE L.: Diagnosis and treatment of testis tumors (ab), Feb., 314
- DE BACKER, JEAN: Results of an inquiry into accidents following intravenous injection of contrast media for examination of the urinary system (ab), June, 913
- DeBAKEY, MICHAEL E., and OCHSNER, ALTON: Hepatic amebiasis: a 20 year experience and analysis of 263 cases (ab), Feb., 300
- De COURSEY, ELBERT.: Pathology of ionizing radiation (ab), March, 480
- DEEB, PAUL H., and STILSON, WALTER L.: Roentgen manifestations of lymphosarcoma of the stomach, April, 529
- DE GROOT, J. W. C.: Bilateral superior vena cavae accompanied by patent ductus arteriosus (ab), June, 900
- DELLER, PETER: Fibrosarcoma of the tongue after interstitial irradiation. Report of a case (ab), May, 795
- DEL VALLE, BERNARDO. See MARTIN, HAYES
- DeMUYDER, EDGARD. See STURGIS, SOMERS H.
- DE NAVASQUEZ, S. J., TROUNCE, J. R., and WAYTE, A. B.: Lipoid pneumonia (non-inhalation) in carcinoma of the lung treated by radiotherapy (ab), May, 795
- DENNY, FRANK: "The flying foetus." Case of hyperextended attitude encountered in a transverse presentation (ab), April, 619
- DENSEN, P. M. See HAHN, P. F.
- DENSTAD, TORFINN: Arteriography in two cases of malignant tumors (melanoma and neurinoma) (ab), March, 469
- DEPIERRE, R. See PRUVOST, P.
- DERMAN, HERBERT, PIZZOLATO, PHILLIP, and ZISKIND, JOSEPH: Multicentric osteogenic sarcoma in Paget's disease with cerebral extension (ab), Jan., 146

- D'ERRICO, A.: Aortography with oxygen as the contrast medium. Preliminary clinical and experimental results (ab), June, 899
- DeSANCTIS, ADOLPH G. See SOUTHARD, SAMUEL C.
- DeSAUSSURE, RICHARD L., Jr., SCHEIBERT, CHARLES D., and HAZOURI, LOUIS A.: Astrocytoma grade III associated with profuse subarachnoid bleeding as its first manifestation. Case report (ab), Feb., 284
- DEVIK, FINN: Histological and cytological changes produced by alpha-particles in the skin of mice (ab), Jan., 159
- See KREYBERG, LEIV
- DeWEERD, JAMES H. See MAYO, CHARLES W.
- deWINTER, JAN G.: Some preliminary clinical observations on the use of radioactive isotopes for the localisation of brain tumours (ab), April, 598
- DEYSSON. See SERVELLE
- DIABETES INSIPIDUS
- with honeycomb lungs: presumed normocholesteremic xanthomatosis (ab), A. A. G. Lewis and J. Smart, Jan., 134
- DIAGNOSIS. See Roentgen Rays, diagnosis
- DIAPHRAGM
- See also Hernia, diaphragmatic
- diaphragmatic deformation of liver (ab), G. S. Christie, April, 610
- spontaneous pneumothorax, the result of a ruptured diaphragm complicating pneumoperitoneum (ab), J. J. Repa and H. R. Jacobson, March, 448
- two unusual tumors, Marvin M. Keirns, April, 542
- DIAPHYSIAL ACLASIS. See Exostoses
- DIBENAMINE
- changes in composition of blood plasma of rat during acute radiation syndrome, and their partial mitigation by dibenamine and cortin (ab), Henry I. Kohn, March, 478
- DI CHIRO, GIOVANNI: Mediastinal tumour simulating left ventricular enlargement: diagnosis by means of angiocardiography (ab), March, 451
- and LINDGREN, ERIK: Radiographic findings in 14 cases of Sturge-Weber syndrome (ab), April, 598
- DICKERSON, WILLARD W. See HOLT, JOHN F.
- DIEHL, ANTONI. See ADAMS, FORREST H.
- DIGESTIVE SYSTEM
- See also Gastro-Intestinal Tract; Intestines; Stomach; etc.
- emergency diagnosis of upper digestive tract bleeding by roentgen examination without palpation ("Hampton technic"), Harvey C. Knowles, Benjamin Felson, Nathan Shapiro, and Leon Schiff, April, 536
- DIGMAN, GEORGE J. See GOBBEL, WALTER G., Jr.
- DIMITZA, ALEX.: Technique and evaluation of venography of the extremities (ab), June, 908
- DIODONE. See Fallopian Tubes
- DIODRASE. See Brain, cancer; Cardiovascular System; Iodine and Iodine Compounds
- di PALMA, SALVATORE. See TWOMBLY, GRAY H.
- DISCOGRAPHY. See Spine, intervertebral disks
- DIVELEY, WALTER, and DANIEL, ROLLIN A., Jr.: Primary solitary neurogenic tumors of the lung (ab), Jan., 132
- DIVERTICUL. See Esophagus; Intestines; Pharynx; Stomach
- DIXON, W. R., FISH, F., and MORRISON, A.: Preliminary depth dose and isodose measurements for cobalt-60 teletherapy unit (ab), Feb., 318
- DOCKERTY, MALCOLM B. See SCANDALIS, RICHARD
- DÖRKEN, HORST: On scleroderma with involvement of the esophagus (ab), April, 605
- DOGAN, SERGIJE. See GVOZDANOVIC, VLADIMIR
- DOIG, R. K., FUNDER, J. F., and WEIDEN, S.: Serial gastric biopsy studies in a case of duodenal ulcer treated by deep x-ray therapy (ab), April, 630
- DOLICHOSIGMOID. See Sigmoid
- DOMONIKOS, ANTHONY N. See ANDREWS, GEORGE C.
- DONALD, DAN C., Jr., KESMODEL, KARL F., Jr., ROLLINS, STACY L., Jr., and PADDISON, RICHARD M.: Improved technic for percutaneous cerebral angiography: a preliminary report (ab), March, 441
- DONALDSON, DAVID D. See COGAN, DAVID G.
- DONALDSON, LILIAN: Roentgenologic examination of the esophagus (ab), Jan., 130
- DONATH, DOUGLAS H. See OBLATH, ROBERT W.
- DORFMAN, MILTON. See GOTTlieb, CHARLES
- DOSAGE. See Roentgen Therapy; Skin, cancer; Uterus, cancer; etc.
- DOSIMETER. See Roentgen Rays
- DOSS, A. KELLER, and QUIARTE, HUMBERTO A.: Evaluation of the surgical kidney employing translumbar aortography (ab), Feb., 307
- DOTTER, CHARLES T., and STEINBERG, ISRAEL: Angiocardiography (ab), June, 897
- Rapid serial contrast angiography (ab), June, 908
- STEINBERG, ISRAEL, and BALL, ROBERT P.: Angiography (ab), March, 467
- See STEINBERG, ISRAEL
- See HONIG, EDWARD I.
- See HORGER, EUGENE L.
- See MCCOY, HERBERT I.
- DOUB, HOWARD P.: Mediastinal cysts of embryologic origin (ab), April, 604
- DOUGHERTY, JOHN A.: Circumcaval ureter (ab), May, 785
- DOUGLAS, D. M., GHENT, W. R., and ROWLANDS, S.: Production of hypochlorhydria by beta radiation of the stomach (ab), May, 796

- DOW, J. D.:** Venography of the leg, with particular reference to acute deep thrombophlebitis and to gravitational ulceration (ab), March, 468
- DOWNING, DANIEL F., ANTONIUS, NICHOLAS A., PAR-ENT, SOL, GREEN, HENRY, WELKIND, ALLEN, and CARRIGAN, FRANCIS P.:** Congenital heart disease. II. Angiocardiography, aortography and cardiac catheterization (ab), Jan., 137
- DRESSLER, W. See ALBRECHT, K.**
- DUBLIN, JOHN W., and ADY, ALBERT E.:** Hypertrophic pyloric stenosis; case report of an infantile type followed by an adult type (ab), April, 606
- DUBOIS-FERRIERE, H. See SARASIN, R.**
- DUCTUS ARTERIOSUS**
- bilateral superior vena cavae accompanied by patent ductus arteriosus (ab), J. W. C. De Groot, June, 900
 - new angiocardiographic signs of patent ductus arteriosus (ab), R. H. Goetz, March, 452
 - thoracic aortography, with special reference to its value in patent ductus arteriosus and coarctation of the aorta (ab), Gunnar Jönsson, et al, June, 898
- DUCEING, J., MARQUÉS, P., BAUX, R., PAILLÉ, J., and VOISIN, R.:** Physiology of the osseous circulation (ab), Feb., 301
- DUDLEY, H. C. See MULRY, W. C.**
- DUFF, P. A. and GRANGER, W. H.:** Diagnosis of involvement of inferior vena cava in renal neoplasms (ab), Feb., 308
- DUNAVANT, W. DAVID. See POOL, R. M.**
- DUNDON, CARROLL C. See CALVY, GEORGE L.**
- DUODENAL TUBE**
- radiologic examination of small intestine by means of duodenal tube, especially for diagnosis of tumors (ab), A. Lura, Feb., 296
- DUODENUM**
- See also Fistula
 - chronic intrinsic obstruction of stomach and duodenum in newborn (ab), Clifford D. Benson and John J. Coury, May, 769
 - duodenum inversum; unusual case (ab), Seán O'Beirn, May, 771
 - duodenal obstruction in the newborn (ab), J. O. Tankin, March, 457
 - gallstone impacted in duodenal cap, John F. Riesser and Benedict Vicas, March, 401
 - neurovascular mechanism of stomach and duodenum (ab), H. B. Benjamin, Feb., 294
- cancer**
- chronic peptic duodenal ulcer with cancerous transformation (ab), E. F. Geever, et al, Jan., 142
- fistula. See Fistula'**
- roentgenography**
- air-contrast study of duodenal bulb: its importance in diagnosis of duodenal ulcer, Ralph R. Meyer, March, 393
 - roentgen appearance of a paraneuritic abscess perforating into duodenum (ab), Pierre Eggmann, April, 621
- tumors**
- malignant tumors; 2 cases (ab), Nathaniel H. Schwartz, et al, Feb., 296
- ulcers. See Peptic Ulcer**
- DU SAULT, LUCILLE. See NOLAN, JAMES F.**
- DWAN, PAUL F. See ADAMS, FORREST H.**
- DWARFISM**
- osteoneuropathy in children (ab), J. James Cancelmo and Ralph S. Brumer, May, 772
 - renal rickets simulating "metaphyseal dysostosis"; case (ab), G. M. Muller and H. A. Sissons, April, 613
- DYSCHONDROPLASIA**
- Maffucci's syndrome (dyschondroplasia with hemangiomas); case with early osseous changes (ab), J. Fred Mullins and Clarence S. Livingood, Feb., 304
- DYSOSTOSIS, CLEIDOCRANIAL. See Clavicle**
- DYSOSTOSIS, METAPHYSAL. See Bones**
- DYSOSTOSIS MULTIPLEX. See Lipochondrodystrophy**
- DYSPLASIA, FIBROUS. See Bones, diseases; Cranium**
- DYSPLASIA, MONOSTOTIC FIBROUS. See Ribs**
- DYSPLASIA, POLYOSTOTIC FIBROUS. See Bones**
- DYSPNEA**
- bronchographic study (ab), P. L. Martin, May, 758
- DYSTROPHY**
- muscular**
- bone dystrophy associated with muscular dystrophy (myopathy) (ab), D. W. Ashby, et al, May, 778
 - heart in progressive muscular dystrophy (ab), Jacob Zatzuni, et al, May, 767
 - juvenile type of Werner's syndrome: progressive musculo-cutaneous dystrophy observed for 18 years (ab), Donald C. Shelby and John O. Vaughn, March, 461
- DZIEWIATKOWSKI, DOMINIC D.:** Radiostographic visualization of sulfur-35 disposition in the articular cartilage and bone of suckling rats following injection of labeled sodium sulfate (ab), April, 632
- E**
- EAR**
- some experiences in management of cancer of middle ear and mastoid (ab), Walter L. Mattick and John W. Mattick, April, 623
- EBBENHÖJ, ERIK:** Experiences in the treatment of skin cancer with ultrasoft roentgen rays, 1933-1936 (ab), May, 788
- ECKER, ARTHUR, and RIEMENSCHNEIDER, PAUL:** Deliberate thrombosis of intracranial arterial aneurism by partial occlusion of the carotid artery with arteriographic control (ab), March, 441
- EDELMANN, ABRAHAM:** Adrenal shielding and survival of rats after x-irradiation (ab), Feb., 321
- EDEMA. See Lungs, edema**
- EDITORIALS**
- Bell, Joseph Clark, president of the Radiological Society of North America, Feb., 261
 - cobalt⁶⁰ as a source for radiotherapy, Jan., 113
 - dental manifestations of systemic disease, June, 883
 - ever-widening scope of radiology, March, 425
 - irradiation through grids, G. Failla, March, 424
 - new appointments to editorial staff, April, 584
 - radiation dosage planning and dosage calculation, Edith H. Quimby, June, 881
 - radiologic examination of the obstetric patient, Robert P. Ball, April, 583
 - radiology and related sciences, Lauriston S. Taylor, May, 740
- EDWARDS, RALPH W.:** A roentgenographic study of edentulous jaws (ab), June, 893
- EDWARDS, RAYMOND R. See MESCHAN, ISADORE**
- EFFLER, DONALD B.:** Solitary lung tumors (ab), Feb., 289
- EFFUSION. See Pericarditis; Pleurisy**
- EGGENSCHWYLER, H. See RÜTTNER, J. R.**
- EGGMANN, PIERRE:** Bipartite os lunatum (ab), Feb., 306
- Roentgen appearance of a paraneuritic abscess perforating into the duodenum (ab), April, 621
- EHNI, GEORGE. See MORETON, ROBERT D.**
- EHRECKE, KARL-HEINZ:** Aluminum lung (ab), May, 761
- EHRLICH, HARRY. See MARTIN, HAYES**
- EISENSTADT, J. S.:** Primary carcinoma of the female urethra with metastases (ab), May, 790
- EKINS, R. P. See SEMPLER, ROBERT**
- ELBOW**
- bow elbow (cubitus varus) (ab), Don King and Charles Secor, June, 907
- ELDRIDGE, J. H. See JACOBSON, L. O.**
- ELECTROCARDIOGRAPHY. See Aneurysm, cardiac; Arteries, pulmonary; Cardiovascular System; Heart**
- ELFERSY, MARCOS. See BASILE, ALFREDO R.**
- ELLENBOGEN, LEONARD S., CROWE, ALDRICH C., and GREEN, MARTIN:** Roentgen findings in the diagnosis and management of infantile scurvy with a report of three cases (ab), Jan., 147
- ELLIS, V. H., and TAYLOR, J. G.:** Diaphyseal acclasis: report of an unusual case (ab), Jan., 130
- EMBRYO**
- radiation hazards to embryo and fetus, Liane Brauch Russell and W. L. Russell, March, 369
- EMPHYSEMA**
- acute pneumocholecystitis; case report and brief review of literature, Albert F. Rocco, R. R. Hunt and J. Savran, Feb., 228
 - cholecystitis emphysematosa (ab), Carl F. Qvist, Jan., 144
 - lobar emphysema simulating a giant emphysematous bulla (ab), Ph. Daumet and J. Le Melleter, April, 603
 - mediastinal emphysema complicating induction of pneumoperitoneum (ab), Maurice J. Small and R. E. Fremont, March, 451
 - obstructive emphysema with defect of anterior mediastinum; case (ab), James E. Lewis and Willis J. Potts, March, 451
 - radiologic diagnosis (ab), J. M. S. Knott and Ronald V. Christie, May, 758
- ENCEPHALITIS**
- suprasellar (Rathke's pouch) cyst; unusual case simulating successively rheumatic fever, encephalitis, and brain-stem tumor; prolonged postoperative recovery and development of puberty precoc (ab), Alexander C. Johnson and John M. Meredith, Feb., 284
- ENCEPHALOGRAPHY. See Brain**
- ENDOCRINE GLANDS**
- See also Pituitary Body; Thyroid; etc.
 - clinical study of visceral lesions and endocrine disturbances of diffuse scleroderma; 8 cases (ab), Javier Robles Gil, March, 470
 - dental roentgenologic manifestations of systemic disease. I. Endocrine disturbances, Edward C. Stafne, Jan., 9
- ENDOMETRIUM**
- See also Uterus, cancer; Uterus, tumors
 - endometriosis of recto-sigmoid (ab), Gordon J. Culver and Milton V. Caldwell, Feb., 298
- ENEMA. See Rectum**
- ENERSON, DANIEL M. See ALLEN, J. GARROTT**
- ENGEL, WILLIAM J.:** Nephrocalcinosis (ab), Jan., 153
- ENGELMANN'S DISEASE. See Bones, atrophy**
- ENGESST, ARNE, IMERSLUND, OLGA, and BLYSTAD, WILHELM:** Skeletal changes resembling scurvy in infantile hypothyroidism before and after thyroid therapy (ab), May, 778
- ENGSTROM, A., and WEGSTEDT, L.:** Equipment for micro-radiography with soft roentgen rays (ab), April, 622
- EOSINOPHILS**
- differential diagnosis of transient lung infiltration with eosinophilia (Loeffler's syndrome) (ab), A. F. Essellier and B. J. Koszewski, May, 764
 - eosinophilic granuloma of rib (ab), David R. Weir, June, 906
 - Loeffler's syndrome: transient pulmonary infiltration with eosinophilia (ab), Charles A. Heiken and E. Robert Wiese, Feb., 290

- EPIDERMIS.** See Skin
- EPIDERMOLYSIS**
- esophageal changes in epidermolysis bullosa hereditaria dystrophica (ab), H.-G. Meyer-Krahmer, May, 768
- EPIPHYSES**
- renal rickets simulating "metaphyseal dysostosis"; case (ab), G. M. Müller and H. A. Sissons, April, 613
 - vascular epiphyseal changes in congenital dislocation of hip: results in adults compared with results in coxa plana and in congenital dislocation without vascular changes (ab), William K. Massie, March, 464
- EPSTEIN, BERNARD S.** See WASCH, MILTON G.
- EPSTEIN, HERMAN C.** See THOMPSON, VERNON P.
- EPSTEIN, ISAAC:** Bronchial adenoma in a supernumerary tracheal lobe. Report of unusual case (ab), March, 448
- EPSTEIN, JOSEPH A., and DAVIDOFF, LEO M.:** Chronic hypertrophic spondylitis of the cervical spine with compression of the spinal cord and nerve roots (ab), June, 907
- EPSTEIN, NATHAN, and RITTER, JOSEPH A.:** Intra-abdominal calcification in an infant. Report of a case (ab), Feb., 300
- ERBSLÖH, J.:** Roentgenologic demonstration of the female genital apparatus with the aid of Jodöl and Jodsol (ab), April, 618
- ERICSSON, NILS O., and LINDBOM, ÅKE:** Intravenous urography in renal tuberculosis (ab), March, 466
- ERNST, K. F., BEELER, THOMAS T., and SMITH, LEWIS A.:** Cytologic and radiologic observations in lymphosarcoma of the stomach. Report of a case (ab), March, 456
- ERNSTENE, A. CARLTON, and HAZARD, JOHN B.:** Extensive calcification of the myocardium. Report of a case (ab), April, 605
- ERYTHEMA, NODOSUM**
- possible significance of associated pulmonary hilar adenopathy (ab), C. Clifford Johnson, et al, March, 449
- ERYTHROCYTES**
- circulating red cell volume and body hematocrit in normal pregnancy and puerperium by direct measurement, using radioactive red cells (ab), William L. Caton, et al, April, 631
 - effect of x-irradiation on erythropoiesis, plasma and cell volumes (ab), Jacob Furth, et al, Jan., 159
 - hemangioma with purpura, thrombocytopenia, and erythrocytopenia (ab), Maxwell Bogin and James Thurmond, April, 630
 - role of erythrocyte in blood iodine transport using radioiodine I¹³¹ (ab), Joseph B. Boatman and Campbell Moses, Feb., 320
- ESCHENBRENNER, ALLEN B.** See LORENZ, EGON
- ESOPHAGUS**
- complete obstruction of esophagus following Scutran ingestion (ab), C. L. Hinkel, May, 768
 - esophageal changes in epidermolysis bullosa hereditaria dystrophica (ab), H.-G. Meyer-Krahmer, May, 768
 - esophagus and mediastinal lymphadenopathy in bronchial carcinoma, Felix G. Fleischner, Jan., 48
 - extramucosal intramural enteric cyst; case (ab), Bernard D. Rosenak and Helen D. Van Vactor, June, 901
 - heterotopic gastric mucosa in the esophagus with ulceration and stricture formation (ab), Lewis H. Boshier, Jr. and Frederick H. Taylor, Feb., 294
 - persistent vomiting due to cardio-esophageal relaxation in infancy (ab), Peter H. Spohn and C. Gordon Campbell, Jan., 140
 - retrograde extrusion or prolapse of gastric mucosa into esophagus (ab), Maurice Feldman, June, 901
 - scleroderma with involvement of esophagus (ab), Horst Dörken, April, 605
 - spontaneous rupture (ab), M. Eugene Flipse, Jan., 140
- abnormalities**
- anomalous lobe of lung arising from esophagus (ab), Stephen L. Gans and Willis J. Potts, Feb., 288
 - congenital short esophagus; review of literature and 8 original cases, including one autopsy report (ab), William J. Sinclair, March, 454
- atresia**
- congenital tracheo-esophageal fistula without atresia (ab), James A. Helmsworth and Charles V. Pyles, March, 454
 - diagnosis and preoperative management of congenital atresia and tracheo-esophageal fistula (ab), Osler A. Abbott and William A. Hopkins, Jan., 139
- cancer**
- management of carcinoma of cervical esophagus (ab), Danely P. Slaughter and Erwin H. Roesser, May, 155
 - planning technic for roentgen treatment of carcinoma of esophagus and other deep-seated tumors (ab), Olov Dahl, March, 472
 - roentgen rotation therapy; dosage problems; preliminary results (ab), Inge Gynning, April, 625
 - roentgen treatment (ab), Rolf Köhler, Jan., 155
- diverticula**
- esophageal fibromyoma associated with diverticulum (ab), Robert M. Hoyne and J. C. T. Rogers, May, 767
 - goitre plongeant (plunging goiter) associated with pharyngo-esophageal diverticulum; case, Morris Shohodkin, March, 378
- fistula.** See Fistula
- roentgenography**
- roentgenologic examination (ab), Lilian Donaldson, Jan., 139

- tumors**
- benign polypoid tumor (ab), Andrew F. McBride, Jr., June, 901
 - fibromyoma associated with diverticulum (ab), Robert M. Hoyne and J. C. T. Rogers, May, 767
- ESSELLIER, A. F., and KOSZEWSKI, B. J.:** On the differential diagnosis of transient lung infiltration with eosinophilia (Loeffler's syndrome) (ab), May, 764
- ESTROGENS**
- tissue localization and excretion routes of radioactive diethylstilbestrol (ab), Gray H. Twombly and Erwin F. Schoenewaldt, Feb., 320
 - tracer studies of radioactive sodium estrone sulfate (S³⁵) in cases of advanced breast cancer (ab), Edward F. Lewison, et al, April, 631
- ESTRONE, RADIOACTIVE.** See Estrogens
- ETHMOID SINUS**
- orbithethmoidal osteoma (ab), Byron G. McKibben and Ernest R. Casey, Jr., March, 445
- diETHYLSTILBESTROL.** See Estrogens
- EVANS, ARTHUR T.** See SMITH, PARKE G.
- EVANS, H. D.** See BELCHER, E. H.
- EVANS, JOHN M.** See COOKE, FRANCIS N.
- EVANS, P. R. C.** See NOWELL, STANLEY
- EVANS, W. W., GRANKE, R. C., WRIGHT, K. A., and TRUMP, J. G.:** Absorption of 2-mev constant potential roentgen rays by lead and concrete. April, 560
- EVASHWICK, GEORGE:** Giant benign duodenal ulcer: report of a case (ab), Feb., 296
- EVERETT, E. FRANK, and RIGLER, LEO G.:** Cholecystography with telepaque. Preliminary report, April, 524
- EXERCISE**
- effects of thyroid and radiation on sensitivity to hypoxia, basal rate of O₂ consumption and tolerance to exercise (ab), Willie W. Smith and Falconer Smith, April, 636
 - exercise effects on tolerance to radiation (ab), Falconer Smith and Willie W. Smith, April, 636
- EXOPHTHALMOS**
- irradiation of pituitary in treatment of malignant exophthalmos (ab), William H. Beierwaltes, March, 471
- EXOSTOSES**
- diaphyseal acalasia: unusual case (ab), V. H. Ellis and J. G. Taylor, Jan., 150
- EXTREMITIES**
- See also Thrombophlebitis; Varicose Veins
 - blood supply**
 - angiography (ab), Charles T. Dotter, et al, March, 467
 - deep vein valves: venographic study in normal and post-phlebotic states (ab), Josephus C. Luke, Feb., 310
 - percutaneous retrograde phlebography of the leg (ab), Tore Sylvan, May, 786
 - phlebography of leg in erect position (ab), H. William Scott, Jr. and John F. Roach, June, 909
 - reflux of intestinal chyle in lymphatics of leg (ab), Servelle and Deysson, Jan., 154
 - technic and evaluation of venography (ab), Alex. Dimtza, June, 908
 - venography, with particular reference to acute deep thrombophlebitis and to gravitational ulceration (ab), J. D. Dow, March, 468
- EYES**
- See also Cataracts; Lens; Orbit
 - ocular complications encountered in intracranial arteriography (ab), Harold F. Falls, et al, April, 598
 - pathogenesis of ophthalmoplegic migraine (ab), Bernard J. Alpers and H. Edward Yaskin, March, 445

F

- FAINSINGER, M. H.:** Calcification of the left atrium (ab), March, 454
- FALK, BENGT:** Calcifications in the track of the needle following ventricular puncture (ab), March, 442
- FALLOPIAN TUBES**
- See also Fistula
 - advantages and disadvantages of salpingography with particular reference to use of diiodone viscous (ab), J. H. E. Bergin, Jan., 152
 - hysterosalpingography with a water-soluble medium in investigation of infertility (ab), Mary Pollock and Ella Preiskel, April, 618
 - Joduron-S, a new water-soluble viscous contrast medium for hysterosalpingography (ab), F. K. Fischer and Lorentz Meyer, May, 782
 - progress in gynecologic roentgen diagnosis with special consideration of sterility (ab), H. Goetze, Jan., 151
 - roentgenologic demonstration of female genital apparatus with aid of Jodöl and Jodsol (ab), J. Erbslöh, April, 618
 - significance of pressure in hysterosalpingography: new instrument for measuring pressure (ab), C. Müller, May, 783
- FALLS, HAROLD F., BASSETT, ROBERT C., and LAMBERTS, AUSTIN E.:** Ocular complications encountered in intracranial arteriography (ab), April, 598
- FANCHER, PAUL S.:** Syphilis of the stomach (ab), June, 903
- FATIGUE FRACTURES.** See Tibia
- FAWCETT, N. W.** See GEEVER, E. F.
- FEINDT, H. R.** See BÜCKER, J.
- FEIRING, EMANUEL H.** See FEIRING, WILLIAM W.
- FEIRING, WILLIAM W., FEIRING, EMANUEL H., and DAVIDOFF, LEO M.:** Fibrous dysplasia of the skull (ab), May, 779

- FELDMAN, MAURICE:** Retrograde extrusion or prolapse of the gastric mucosa into the esophagus (ab), June, 901
- FELSTED, EGGERT T.** See **KELLY, KEITH H.**
- FELSON, BENJAMIN.** See **HELMSWORTH, JAMES A.**
- See **KNOWLES, HARVEY C.**
- FELTON, LELAND R.:** Beam-directed high-dosage radiotherapy of bronchogenic carcinoma, Jan., 43
- FEMUR**
- fractures of neck of femur in children: clinical study (ab), Guillermo Allende and Luis G. Lezama, March, 465
- FETUS**
- See also **Craniometry**; **Lithopedion**; **Monsters**; **Pregnancy**
- appearance of centers of ossification in human pelvis before birth (ab), Carl C. Francis, April, 610
- craniofacial diagnosed prenatally: review of literature with case report (ab), Generoso d'Aversa and Dudley H. Longgren, March, 444
- “flying fetus”: case of hyperextended attitude encountered in a transverse presentation (ab), Frank Denny, April, 619
- radiation hazards to embryo and fetus, Liane Brauch Russell and W. L. Russell, March, 369
- FETZER, H.:** Metastasizing adenoma of the thyroid (ab), May, 790
- FIBROMA.** See **Tumors, fibroma**
- FIBROMYOMA.** See **Tumors, fibromyoma**
- FIBROSARCOMA.** See **Sarcoma, fibrosarcoma**
- FIELDS, THEODORE, and LEROY, GEORGE V.:** An accurate method for the measurement of radiiodine in the thyroid gland by an external counter, Jan., 57
- FILDES, CHARLES E.** See **LAWTON, STANLEY E.**
- FILMS.** See **Röntgenograms**
- FINCHER, EDGAR F.:** Arteriovenous fistula between the middle meningeal artery and the greater petrosal sinus (ab), May, 787
- FINDLAY, CHARLES W., Jr., and MAIER, HERBERT C.:** Anomalies of the pulmonary vessels and their surgical significance, with a review of the literature (ab), March, 450
- FINDLAY, M.** See **MUSKAT, D. A.**
- FINE, JACOB.** See **FRIEDMAN, EDWARD W.**
- FINK, DANIEL L.:** Coin lesions of the lung (ab), May, 762
- FINKE, H.:** Contributions to the pathological picture of bronchial adenoma (ab), May, 763
- FINN, FREDERICK W.** See **WHITE, WILLIAM C.**
- FISCHER, F. K., and MEYER, LORENTZ:** Joduron-S, a new water-soluble viscous contrast medium for hysterosalpingography (ab), May, 782
- FISH, F.** See **DIXON, W. R.**
- FISHER, SAMUEL H., and STANLEY, ROBERT R.:** Porphyria. Cause of nonspecific small intestinal disturbance (ab), May, 770
- FISTULA**
- anorectal**
- congenital malformations of rectum and anus, with special reference to treatment of associated fistulas (ab), Ernest E. Arnheim, May, 772
- stereoscopic radiography in diagnosis (ab), Louis J. Hirschman, May, 772
- arteriovenous**
- between middle meningeal artery and greater petrosal sinus (ab), Edgar F. Fincher, May, 787
- choledochoduodenal**
- following perforation of duodenal ulcer: treatment by subtotal gastrectomy (ab), G. F. Wollgast and W. P. Stampfli, June, 904
- duodenocolic**
- benign fistula (ab), C. Sherrill Rife, May, 771
- esophagotracheal**
- congenital fistula without esophageal atresia (ab), James A. Helmsworth and Charles V. Fyries, March, 454
- diagnosis and preoperative management of congenital esophageal atresia and tracheoesophageal fistula (ab), Osler A. Abbott and William A. Hopkins, Jan., 139
- gastrocolic**
- of unexplained origin (ab), Enrico Uehlinger, Feb., 295
- gastrojejunocolic**
- following vagotomy for marginal ulcer (ab), Benjamin F. Byrd, Jr., March, 456
- salpingovaginal**
- case (ab), Gershom J. Thompson and Virgil S. Counseller, May, 784
- FLATFOOT.** See **Foot**
- FLATULENCE**
- intestinal gas during pyelography (ab), Myron J. Tremaine, et al., May, 784
- intestinal gas in radiology (use of acetylcholine and pituitary extract) (ab), M. Arias Bellini, March, 470
- FLAX, NATHAN, and WALDRON, ROBERT:** Syringe wired for automatic x-ray exposure, May, 726
- FLEISCHNER, FELIX G.:** The esophagus and mediastinal lymphadenopathy in bronchial carcinoma, Jan., 48
- FLETCHER, A. G., Jr., and HORN, ROBERT C., Jr.:** Giant cell tumors of tendon sheath origin. A consideration of bone involvement and report of two cases with extensive destruction (ab), Feb., 307
- FLICKINGER, F. MILES:** Monostotic fibrous dysplasia of bone. Report of a case involving three contiguous ribs treated by wide resection of the thoracic cage (ab), Feb., 303
- FLIPSE, M. EUGENE:** Spontaneous rupture of the esophagus (ab), Jan., 140
- FLOCCULATION TEST.** See **Blood, colloids**
- FLOOD, CHARLES A.** See **LEPORE, MICHAEL J.**
- FLUHARTY, REX G.** See **CATON, WILLIAM L.**
- FLUIDS**
- determination of the sodium²⁴ “space” in infants, children, and adults (ab), Anne Perley, et al., Feb., 318
- significance of radiosodium space in human disease: comparison with thiocyanate space (ab), Jerry K. Aikawa, June, 920
- FLUORENE**
- excretion of radioactivity during a four-day period following the feeding of carbon-14-labeled 2-acetylaminofluorene to rats (ab), John H. Weisburger, et al., Jan., 158
- FOGG, LLOYD C., and COWING, RUSSELL F.:** Changes in cell morphology and histochemistry of the testis following irradiation and their relation to other induced testicular changes. I. Quantitative random sampling of germinal cells at intervals following direct irradiation (ab), Feb., 323
- Changes in cell morphology and histochemistry of the testis following irradiation and their relation to other induced testicular changes. II. Comparison of effects of doses of 1,440 r and 5,050 r with 300 r (ab), Feb., 323
- FONTAINE, J.** See **van der PLAATS, G. J.**
- FOOT**
- See also **Calcaneum**
- congenital posterior bowing of tibia with talipes calcaneovalgus (ab), B. F. Miller, Jan., 151
- tarsal anomalies and peroneal spastic flatfoot (ab), Frederick S. Webster and William M. Roberts, May, 782
- FOOTE, J. B., and MACLAGAN, N. F.:** Thigh-neck clearance. A simplified radioactive test of thyroid function (ab), May, 793
- FORAMEN, WINSLOW'S.** See **Hernia, internal**
- FORBES, GILBERT B.** See **PERLEY, ANNE**
- FOREIGN BODIES.** See **Stomach**
- FOUNDRIES.** See **Pneumoconiosis**
- FOX, SAMUEL L., and NEWELL, EDWARD A.:** Sclerosis of the antrum (ab), Feb., 285
- FRACTURES**
- See also under names of bones
- Looser-Milkman syndrome: occurrence in case of idiopathic steatorrhea (ab), Christopher Strang, March, 461
- multiple spontaneous “pseudo-fractures” of bone (Milkman's syndrome) (ab), Stanley Nowell, et al., June, 906
- problems of pathological fractures (ab), Otto Lehmann, March, 461
- roentgenologic apparatus attachable to Bell fracture table (ab), Ray K. Runge, et al., June, 912
- FRANK, HOWARD A.** See **SCHWARTZ, A.**
- FRALICK, FRANK T., and WELSMAN, HUGH S.:** Mediastinal teratoma (ab), Jan., 135
- FRANCIS, CARL C.:** Appearance of centers of ossification in the human pelvis before birth (ab), April, 610
- FRANK, HOWARD A.** See **FRIEDMAN, EDWARD W.**
- FRANTZELL, ARNE:** Effect of focal size, shape and “structure” on the roentgenographic representation of small-calibre metal objects (ab), March, 469
- FREED, JOHN H., PENDERGRASS, EUGENE P., and CARNWATH, JOHN W.:** Androgen therapy in the control of pulmonary metastasis from adenocarcinoma of the corpus uteri. Report of a case benefited by androgen therapy (ab), March, 474
- FREEDBERG, A., STONE, URELES, ALVIN L., LESSES, MARK P., and GARGILL, SAMUEL L.:** Treatment of thyroid carcinoma with radioactive iodine (¹³¹) (ab), June, 919
- FREEDMAN (JOSEPH) LECTURES.** University of Cincinnati, March, 429
- FREMONT, R. E.** See **SMALL, MAURICE J.**
- FREUND, A. J.** See **WISHAM, L. H.**
- FRIEDLÄNDER'S BACILLUS.** See **Osteomyelitis**
- FRIEDMAN, EDWARD W., FRANK, HOWARD A., and FINE, JACOB:** Portal circulation in experimental hemorrhagic shock. In vivo roentgen ray studies (ab), June, 910
- FRIEDMAN, SIDNEY, MURPHY, LOIS, and ASH, RACHEL:** Aortic atresia with hypoplasia of the left heart and aortic arch (ab), Feb., 293
- FRIMANN-DAHL, J.:** Radiological experiences in true strangulating obstructions (ab), Jan., 143
- FRONTAL SINUS**
- ossifying fibroma (ab), Simon Ball, Feb., 285
- FRUMESS, GERALD M.** See **LEWIS, HENRY M.**
- FUNDER, J. F.** See **DOIG, R. K.**
- FURTH, JACOB, ANDREWS, G. A., STOREY, R. H., and WISH, LEON:** Effect of x-irradiation on erythropoiesis, plasma and cell volumes (ab), Jan., 159

GALLBLADDER—cont.

- cholecystitis emphysematosa (ab), Carl F. Qvist, Jan., 144
- congenital absence; cholangiography; gallstone solvents (ab), A. J. H. Rains, May, 774
- pulmonary changes following cholecystectomy (ab), Isadore Rudnikoff and Courtenay I. Headland, June, 896
- calculi**
 - gallstone impacted in duodenal cap, John F. Riesser and Benedict Vicas, March, 401
- diverticula**
 - intramural diverticulosis; case (ab), L. Glücker, Jan., 144
- roentgenography**
 - cholecystography with telepaque; preliminary report, E. Frank Everett and Leo G. Rigler, April, 524
 - clinical experience with telepaque, a new gallbladder compound, Russell H. Morgan and Hal B. Stewart, Feb., 231
 - intestinal gas in radiology (use of acetylcholine and pituitary extract) (ab), M. Arias Bellini, March, 470
 - Monophen: a new medium for oral cholecystography (ab), Milton G. Wasch and Bernard S. Epstein, June, 912
 - new position for cholecystography (Kirklin) (ab), John J. Wells, March, 458
 - oral cholecystography: critical review of 200 operated cases (ab), Hugh P. Smith, Jr., and Tom M. Runge, April, 609
 - relationship between excretion of sodium tetradeoxyphenolphthalein and non-opacification of gallbladder (ab), Z. Zsebok, et al, April, 609
- tumors**
 - papilloma (ab), Francis A. Reynolds, May, 774
- GALLIUM, RADIOACTIVE.** See Radioactivity
- GALLY, L.** See LEGER, L.
- GALY, P.** See SANTI, P.
- GAMBACINI, PIERO.** Advantages of a water-soluble iodine compound in bronchography (ab), June, 893
- GAMMA RAYS.** See Radiations; Radium
- GANGLIONECTOMY.** See Thromboangiitis Obliterans
- GANS, STEPHEN L., and POTTS, WILLIS J.:** Anomalous lobe of lung arising from the esophagus (ab), Feb., 288
- GARBER, C. ZENT.** See STRASSBURGER, PAUL
- GARBSCH, H., and THURNHER, B.:** Contribution to the roentgen diagnosis of ceco-colic tumor invagination (ab), Feb., 297
- GARDELLA, GIOVANNI:** Periarthritic calcifications (ab), April, 613
- GARGILL, SAMUEL L.** See FREEDBERG, A. STONE
- GARLAND, L. H., HILL, H. A., MOTTRAM, M. E., and SISSON, M. A.:** Nasopharyngeal irradiation. Relative merits of roentgen and radium therapy for benign conditions (ab), May, 791
- MILLER, E. R., ZWERLING, H. B., HARKNESS, J. T., HINSHAW, H. C., SHIPMAN, S. J., and YERUSHALMY, J.:** Studies on the value of serial films in estimating the progress of pulmonary disease, Feb., 161
- and SISSON, M. A.:** Cancer of the ovary. Results of experiments in 79 cases (ab), June, 915
- GARRISON, HUGH, ANDERSON, JOHN, LAUGHLIN, JOHN S., and HARVEY, ROGER A.:** Comparison of dose distributions in patients treated with x-ray beams of widely different energies, March, 361
- GASTON, E. O.** See JACOBSON, L. O.
- GASTROCTOMY.** See Fistula, choledochoduodenal
- GASTRO-INTESTINAL TRACT**
 - See also Colon; Intestines; Stomach; etc.
 - lesions of upper gastro-intestinal tract in infants and children, Vernon M. Lockard, May, 696
 - mercury lost in gastro-intestinal tract; unusual case (ab), Meyer O. Cantor, May, 768
 - oral banthine, an effective depressor of motility (ab), Michael J. Lepore, et al, March, 455
 - significance of opaque medications in gastro-intestinal tract, with special reference to enteric coated pills (ab), C. L. Hinkel, March, 455
- roentgenography**
 - barium modification with Methocel (ab), Mark M. Marks, Feb., 294
 - observations in peptic ulcer patients treated by vagotomy (ab), Charles A. Privitera, March, 456
 - preliminary studies with colloidal barium (ab), Frank Windholz, et al, March, 455
- tumors**
 - lipomas (ab), Kenneth W. Warren and Frederick H. Brandenburg, May, 768
- GASTROJUNOSTOMY.** See Peptic Ulcer
- GEBAUER, A.:** Body-section roentgenography in the transverse plane in contrast to the vertical: advantages and indications (ab), June, 912
- Transverse tomogram of the normal thorax; a contribution to topographical anatomy in the living man (ab), Jan., 130
- GEEVER, E. F., BOLTON, V. L., and FAWCETT, N. W.:** Chronic peptic duodenal ulcer with cancerous transformation (ab), Jan., 142
- GEFFEN, ABRAHAM.** See COHEN, ABRAHAM F.
- GELLMAN, MOSES.** Fractures of the anterior process of the calcaneus (ab), March, 466
- GENITO-URINARY TRACT**
 - See also Urinary Tract
 - radiation therapy in diseases (ab), William E. Costolow, June, 915
- GERBER, ISAAC (obit),** April, 588
- GERMANN, DONALD R.:** Teleroentgenographic pelvimetry. Preliminary report, April, 548

- GERSHON-COHEN, J., HERMEL, M. B., and GRIFFITH, J. Q., Jr.:** Protective effect of small lead shields during repeated whole-body x-ray irradiation of rats, March, 383
- GESCHICKTER, CHARLES F., and COPELAND, MURRAY M.:** Parosteal osteoma of bone: new entity (ab), May, 776
- GHANTUS, MUSA K.:** Growth of the shaft of the human radius and ulna during the first two years of life (ab), April, 610
- GHENT, W. R.** See DOUGLAS, D. M.
- GHORMLEY, RALPH K.** See RUNGE, RAY K.
- See SCANDALIS, RICHARD
- GIANT-CELL TUMOR.** See Tumors, giant-cell
- GIANTURCO, CESARE:** Gastric double contrast (ab), April, 606
- GIBSON, JOHN G., II.** See CATON, WILLIAM L.
- GIBSON, STANLEY.** See LEININGER, C. R.
- GIESEKING, H.:** Fissure formation in the navicular bone as post-traumatic pseudarthrosis (ab), April, 617
- GILBERT, SAMUEL M.:** Localized walled-off gas pockets due to perforation complicating peptic ulceration (ab), May, 770
- GILLANDERS, A. D.:** Nutritional heart disease (ab), March, 453
- GILLETTE, LEE.** See CARTER, R. FRANKLIN
- GLANDS**
 - See also Adrenals; Endocrine Glands; etc.
 - Sjögren's disease associated with a pulmonary lesion and nephrocalcinosis (ab), Maurice Nellen, April, 620
- GLAUNER, R.:** Pulmonary shadows in Q-fever (ab), May, 762
- GLENN, JOHN C., Jr., TAYLOR, ALLEN, and REEVES, ROBERT J.:** Tumors of the jaws (ab), April, 599
- GLOMUS JUGULARIS**
 - tumors of carotid body type presumably arising from glomus jugularis (ab), James L. Poppen and P. A. Riemschneider, Feb., 286
- GLÜCKER, L.:** Intramural diverticulosis of the gall bladder. Case report (ab), Jan., 144
- GLUSHIEN, ARTHUR S., and MANSUY, MATTHEW M.:** Superior vena caval obstruction with survival after thirty-six years (ab), June, 900
- GOBBEL, WALTER G., Jr., GORDON, JOSEPH, and DIGMAN, GEORGE J.:** Pulmonary artery in bronchiectasis (ab), March, 451
- GOECKE, H.:** Progress in gynecologic roentgen diagnosis with special consideration of sterility (ab), Jan., 151
- GOETZ, R. H.:** New angiocardigraphic sign of patent ductus arteriosus (ab), March, 452
- GOITER**
 - See also Thyroid
 - goitre plongeant (plunging goiter) associated with pharyngo-esophageal diverticulum; case, Morris Slobodkin, March, 378
 - stereoscopic roentgen study regarding the influence of goiter on anatomy and topography of tracheobronchial tree (ab), H. Bruckner, Feb., 287
- GOLD, RADIOACTIVE.** See Radioactivity
- GOLDEN, ROSS.** See LEPORE, MICHAEL J.
- GOLDFARB, WILLIAM S.:** Phantom tumors of the pelvis and a case report (ab), March, 470
- GOLDFEDER, ANNA:** Quantitative evaluation of growth rates in tumors before and after radiation (ab), Feb., 322
- GOLPER, MARVIN N.** See POHLE, ERNST A.
- GOOD, C. ALLEN.** See JOHNSON, C. CLIFFORD
- See MELIN, THOMAS W.
- GOODWIN, WILLIAM E.** See ALLEN, HERBERT C., Jr.
- GORDON, JOSEPH.** See GOBBEL, WALTER G., Jr.
- GOSSET, P.** See PRUVOST, P.
- GOTTLIB, CHARLES, BERANBAUM, SAMUEL L., and DORFMAN, MILTON:** Roentgen features of non-malignant periappendiceal and ileocecal lesions (ab), Feb., 297
- GOTTLIB, LEO.** See SWEENEY, BERNARD J.
- GOULD, DAVID M.:** Roentgenologic diagnosis of congenital cardiovascular malformations (ab), April, 604
- GRANGER, W. H.** See DUFF, P. A.
- GRANKE, R. C.** See EVANS, W. W.
- GRANT, CONSTANCE.** See LOWMAN, ROBERT M.
- GRANULOMA**
 - dental roentgenologic manifestations of systemic disease. III. Granulomatous disease, Paget's disease, acrosclerosis and others, Edward C. Stafne, June, 820
 - does ioduron bronchography damage the lung parenchyma? Contribution to the pathogenesis of granulomatous changes and xanthomatous and interstitial pneumonia in primary lung processes (ab), Hans U. Zollinger, May, 758
- eosinophilic.** See Ribs
- GRAY, L. H., and SCHOLES, M. E.:** Effect of ionizing radiations on the broad bean root. Part VIII. Growth rate studies and histological analyses (ab), Jan., 159
- GREANEY, E. M.** See SNYDER, WILLIAM H., Jr.
- GREEN, ANTHONY:** Low voltage x-ray therapy with a beryllium window tube. Part I. Introduction and advantages (ab), Feb., 316
- and JENNINGS, W. ALAN:** New techniques in radium and radon therapy (ab), March, 476
- GREEN, HENRY.** See DOWNING, DANIEL F.
- GREEN, MARTIN.** See ELLENBOGEN, LEONARD S.
- GREENBERG, L.** See KASTNER, J.
- GREENLER, JOHN J.** See LAFORET, EUGENE G.
- GRÉGOIRE, M.** See MÉTRAS, H.

- GRIBETZ, DONALD, SILVERMAN, SAMUEL H., and SOBEL, ALBERT E.: Vitamin A poisoning (ab), Feb., 304
- GRID THERAPY. See Roentgen Therapy
- GRIFFIN, A. CLARK, CUNNINGHAM, LEW, BRANDT, EUGENIA L., and KUPKE, D. W.: Effect of a carcinogenic azo dye on radiophosphorus turnover in rat-liver nuclei and cytoplasm (ab), Feb., 320
- GRIFFIN, ERNEST P. See LIVESAY, JACKSON E.
- GRIFFITH, GEORGE C. See ZINN, WILLARD J.
- GRIFFITH, J. Q., Jr. See GERSHON-COHEN, J.
- GRIFFITHS, I. H.: Preliminary report on abdominal aortography in urology (ab), March, 466
- GRISWOLD, HERBERT E. See YOUNG, MAURICE D.
- GROHMANN, R.: Case record contribution to acute silicosis (ab), May, 760
- GROSKOPFF, K.-W., BOLCK, F., and BÜLL, H.-J.: Thorotrast injuries (ab), June, 912
- GROSS, J., BOGOROCH, R., NADLER, N. J., and LEBLOND, C. P.: Theory and methods of the radioautographic localization of radioelements in tissues (ab), Feb., 319
- GROSS, ROBERT J., and YELIN, GABRIEL: Multiple myeloma complicating Paget's disease (ab), March, 460
- See RINEBERG, IRVING E.
- GÜNSEL, E.: Chondromalacic spondylitis (ab), April, 615
- GUEST, C. MAYNARD, and JACOBSON, HAROLD G.: Pelvic and extrapelvic osteopathy in rheumatoid spondylitis. Clinical and roentgenographic study of ninety cases (ab), April, 615
- GULLEDGE, WILLIAM H., and WHITE, J. WARREN: Engelmann's disease (progressive diaphyseal hyperostosis). Report of a case (ab), June, 906
- GULOTTA, GASPER A., and LEAVENBROOK, HARRY: Delayed death following intravenous administration of Diodrast (ab), Jan., 155
- GUMS
- carcinoma (ab), Walter L. Mattick and Donald J. Meehan, April, 624
- GURDJIAN, E. S., and WEBSTER, J. E.: Cerebrovascular accidents: surgical management with particular reference to massive intracranial hemorrhage (ab), April, 597
- See WEBSTER, J. E.
- GUSTAFSON, JACK R.: Acute parotitis (ab), April, 599
- GUTENKAUF, CHARLES H.: Beriberi heart in Iowa veterans (ab), Feb., 292
- GUZMAN, LEONARDO: Cancer of the tongue (ab), March, 472
- GVOZDANOVIC, VLADIMIR, and DOGAN, SERGIJE: Use of tomography in diagnosis of basilar impression (ab), Jan., 129
- GYNNING, INGE: Roentgen rotation therapy in cancer of the esophagus. Dosage problems. Preliminary results (ab), April, 625
- Roentgen rotation therapy in cancer of the hypopharynx (ab), April, 624
- H
- HAAS, LEWIS L. See HARVEY, ROGER A.
- HAÜSSLER, GEORG: Indications for contrast visualization of space-occupying processes in the spinal canal (ab), April, 613
- HAHN, P. F., CAROTHERS, E. L., DARBY, W. J., MARTIN, M., SHEPPARD, C. W., CANNON, R. O., BEAM, A. S., DENSEN, P. M., PETERSON, J. C., and MCCLELLAN, G. S.: Iron metabolism in human pregnancy as studied with the radioactive isotope, Fe⁵⁹ (ab), Feb., 318
- HALE, DeFOREST E.: Synovium, with special reference to the clinical and roentgenologic aspects (ab), April, 617
- HALLOCK, HALFORD. See STRASSBURGER, PAUL
- HAMADA, GAWAD: Osteochondromatosis of the hip joint. Report of a case (ab), Jan., 150
- HAMILTON, HOWARD. See WERNER, SIDNEY C.
- HAMPTON TECHNIC. See Peptic Ulcer
- HAMRE, C. J. See BOYDEN, EDWARD A.
- HANDLER, PHILIP and COHN, DAVID V.: Use of radiophosphorus in studies of glomerular permeability of plasma inorganic phosphate (ab), Feb., 320
- HANELIN, JOSEPH, and ROBBINS, LAURENCE L.: Radiology in bone pathology (ab), June, 905
- HANNA, DENIS. See BURROWS, N. F. ELLIOT
- HANSON, NORBERT O. See JOHNSON, C. CLIFFORD
- HARE, HUGH F. See LAHEY, FRANK H.
- HARENESS, J. T. See GARLAND, L. H.
- HARRINGTON, STUART W.: Surgical treatment of circumscribed intrathoracic lesions: lesions found on routine thoracic roentgenologic examinations, with absence of subjective symptoms (ab), May, 762
- HARRIS, WILLIAM: Recent clinical experience with the grid in the x-ray treatment of advanced cancer, March, 343
- Roentgen therapy for cancer of the larynx (ab), June, 913
- HARSHA, WILLIAM N.: Uses of radioactive gold colloid in therapy and palliation of neoplastic disease (ab), June, 919
- HARTENSTEIN, HANS. See LEVINSON, ABRAHAM
- HARTMAN, FRANK W. See SOMMERS, SHELDON C.
- HARTSON, DAVID: Intracranial tumors simulating vascular lesions of the brain. Preliminary report (ab), March, 443
- HARVEY, ROGER A., HAAS, LEWIS L., and LAUGHLIN, JOHN S.: Betatron cancer therapy, Jan., 23
- See GARRISON, HUGH
- HAUBRICH, R.: Multiple aortic aneurysms with unusual locations (ab), Jan., 139
- Roentgen characteristics of the silicosis in relation to occupation (ab), May, 760
- Roentgen picture of the ochre-dust lung (ab), Jan., 135
- HAUSER, THEODORE E., and STEER, ARTHUR: Lymph-angitic carcinomatosis of the lungs: six case reports and a review of the literature (ab), March, 447
- HAYES, GEORGE J. See BLOOR, BYRON M.
- HAZARD, JOHN B. See ERNSTENE, A. CARLTON
- HAZOURI, LOUIS A. See DeSAUSSURE, RICHARD L., Jr.
- HEAD. See Cranium
- HEADLAND, COURTENAY I. See RUDNIKOFF, ISADORE
- HEART
- See also Aneurysm; Cardiovascular System; Pericarditis
- beriberi heart in Iowa veterans (ab), Charles H. Gutenkauf, Feb., 292
- bizarre pulmonary roentgenographic manifestations in heart disease (ab), Walter Newman and Harold G. Jacobson, June, 896
- effect of angiocardiology on heart as measured by electrocardiographic alterations (ab), Willard J. Zinn, et al, April, 604
- in progressive muscular dystrophy (ab), Jacob Zatzuni, et al, May, 767
- nutritional heart disease (ab), A. D. Gillanders, March, 453
- abnormalities. See also Ductus Arteriosus
- angiocardiology in congenital heart disease: anesthesia and technic (ab), D. M. Carnegie, May, 766
- angiocardiology in congenital heart disease of cyanotic type. III. Observations on complete transposition of great vessels. R. N. Cooley and R. D. Sloan, April, 481
- aortic atresia with hypoplasia of left heart and aortic arch (ab), Sidney Friedman, et al, Feb., 293
- congenital heart disease. Angiocardiology, aortography and cardiac catheterization (ab), Daniel F. Downing, et al, Jan., 137
- congenital valvular pulmonary stenosis with or without an interatrial communication: physiologic studies as diagnostic aids (ab), Forrest H. Adams, et al, Feb., 293
- paradoxical brain abscess in congenital heart disease (ab), Ira Cohen, et al, Feb., 285
- single ventricle with a rudimentary outlet chamber; case (ab), Edward C. Lambert, Feb., 292
- situs inversus of abdominal viscera with levocardia; 8 cases submitted to Blalock-Taussig operation (ab), Maurice D. Young and Herbert E. Griswold, Jan., 136
- syndrome of brain abscess with congenital cardiac disease; case with complete recovery (ab), Aaron J. Beller, Feb., 285
- syndrome of Taussig and Bing (ab), O. Bayer, May, 767
- calcification
- extensive calcification of myocardium; case (ab), A. Carlton Ernstene and John B. Hazard, April, 605
- of left atrium (ab), M. H. Fainsinger, March, 454
- of left auricle (ab), P. T. O'Farrell, April, 605
- catheterization. See also Heart, abnormalities
- complication following coronary sinus and cardiac vein catheterization in man (ab), J. McMichael and J. P. D. Mounsey, June, 899
- hypertrophy
- mediastinal tumor simulating left ventricular enlargement: diagnosis by means of angiocardiology (ab), Giovanni Di Chiro, March, 451
- roentgen and differential diagnosis of chronic cor pulmonale (ab), Matthew O. Marks and H. A. Zimmerman, June, 896
- transient periods of cardiac enlargement associated with hypersensitivity to different etiologic agents; case (ab), C. A. McKinlay, June, 897
- insufficiency
- interlobar hydrothorax in cardiac failure (ab), R. F. Robertson, Jan., 136
- pulmonocardiac failure; case (ab), W. F. O'Connell and Y. C. Lee, Feb., 291
- measurement
- determination of individual enlargement of the ventricles: method based on angiocardiology in the left anterior oblique position, Jorge Ceballos and Jairo Isaza B., June, 844
- effect of various factors on roentgenologic determination of cardiac volume (ab), Sven R. Kjellberg, et al, April, 604
- orthodiametry (ab), H. Buchner, April, 605
- roentgenography. See also other subheads under Heart
- contractile dysfunction of heart in kymography (ab), P. Stumpf, April, 605
- fundamentals of interpretation in step kymography, William F. Wagner, May, 720
- heart puncture. II. Cardioangiography: clinical and electrocardiographic results (ab), Virgilio Beato Núñez and Elmo R. Pondsdomenech, June, 897
- heart puncture in man for Diodrast visualization of ventricular chambers and great arteries. Its experimental and anatomophysiological bases and technic (ab), Elmo R. Pondsdomenech and Virgilio B. Núñez, March, 452
- valves. See Aortic Valve; Mitral Valve; Pulmonary Valve; Tricuspid Valve
- HECKERMANN, F. See PSENNER, L.
- HECKERMANN, K.: Pathologic picture of bronchial insufficiency. A contribution to the active behavior of the lungs in respiration (ab), Jan., 131
- HEDINGER, CHR., HITZIG, W. H., and MARMIER, C.: Pulmonary arteriovenous aneurysms and their relation to Osler's disease (ab), May, 764

- HEIKEN, CHARLES A., and WIESE, E. ROBERT:** Löffler's syndrome. Transient pulmonary infiltration with eosinophilia (ab), Feb., 290
- HEIM, G.** See **HÖFFKEN, W.**
- HEISER, SAUL, and SCHWARTZMAN, JOEL J.:** Variations in the roentgen appearance of the skeletal system in myeloma. Feb., 178
- See **JACOBSON, LILLIAN E.**
- HELMSWORTH, JAMES A., MCGUIRE, JOHNSON, FELS, BENJAMIN, and SCOTT, RALPH C.:** Visualization of the coronary arteries during life (ab), Jan., 137
- and **PRYLES, CHARLES V.:** Congenital tracheo-esophageal fistula without esophageal atresia (ab), March, 434
- HEMANGIOMA.** See Tumors, angioma
- HEMATOCRIT.** See Erythrocytes
- HEMATOMA.** See Thorax
- HEMIPLEGIA**
- cerebrovascular accidents: surgical management with particular reference to massive intracranial hemorrhage (ab), E. S. Gurdjian and J. E. Webster, April, 597
- HEMLEY, SAMUEL D., and SCHWINGER, AARON:** Lithopedion. Case report and survey, Feb., 235
- HEMOCHROMATOSIS**
- radioiron studies in case of hemochromatosis (ab), T. Alper, et al, May, 794
- HEMOPTYSIS**
- nodal calcification and serious hemoptysis (ab), Mathey and Mannes, April, 603
- HEMORRHAGE.** See Brain; Digestive System; Hemoptysis; Meninges; Shock
- HEMOTHORAX**
- osteogenic sarcoma arising in traumatic hemothorax and hematoma of thoracic wall; case (ab), H. K. Stauss, May, 776
- HENDTLASS, R. F.:** Chronic upper respiratory tract infections (ab), June, 916
- Low voltage x-ray therapy with a beryllium window tube. Part III. Technique reactions and results (ab), Feb., 316
- HENSCHEL, EGBERT J.** See **LEWIS, HENRY M.**
- HEPATIC DUCTS.** See Bile Ducts
- HEPATOSPLENOGRAPHY.** See Spleen
- HEREDITARY**
- esophageal changes in epidermolysis bullosa hereditaria dystrophica (ab), H. G. Meyer-Krahmer, May, 768
- pelvic horns: a congenital hereditary anomaly within the framework of a malformation syndrome (ab), K. Böck, April, 616
- HERMEL, M. B.** See **GERSHON-COHEN, J.**
- HERNHEISER, G.:** Roentgen anatomy of the lungs (ab), May, 757
- HERNIA**
- diaphragmatic
- case (ab), John R. Ross and Allen C. Johnson, May, 775
- congenital hernia through dome of right diaphragm in adult (ab), Clifford F. Storey and L. D. Kurtz, Feb., 300
- diagnosis of early gastric herniation at esophageal hiatus (ab), Alan S. Johnstone, June, 902
- strangulated right hernia with surgical cure (ab), Samuel D. Kushlan, May, 775
- unusual hernia, with displaced liver (ab), Louis F. Knoepp, March, 439
- internal
- through foramen epiploicum Winslowi (ab), S. Wilk and G. E. Züst, Feb., 301
- HERPES ZOSTER**
- generalized zoster; case following roentgen therapy, associated with chronic lymphatic leukemia, leukemia cutis and Mikulicz's syndrome (ab), Edward L. Bosworth, April, 632
- HERTIG, ARTHUR T.** See **KISTNER, ROBERT W.**
- HESLIN, JOHN E. and MAMONAS, CHRISTOPHER:** Retrocaval ureter: report of four cases and review of literature (ab), Feb., 308
- HESSÉN, INGEMAR:** Roentgen examination of pleural fluid. A study of the localization of free effusions, the potentialities of diagnosing minimal quantities of fluid and its existence under physiological conditions (ab), Jan., 136
- HESTON, WALTER E.** See **LORENZ, EGON**
- HICKINBOTHAM, P. F. J.:** Malignant tumours of the testicle (ab), March, 475
- HIGGINS, T. T.** See **ALLDRED, A. J.**
- HIGINBOTHAM, NORMAN L.:** Management of bone tumors: some debatable problems (ab), March, 472
- HILL, H. A.** See **GARLAND, L. H.**
- HILLER, GLENN I.** See **MOYER, JOHN B.**
- HILLER, HENRY J.** See **POWELL, MOSTYN L.**
- HINDS, J. R.** See **McDOWELL, C.**
- HINE, CHARLES H.** See **HOLDEN, FRANCIS R.**
- HINKEL, C. L.:** Complete obstruction of the esophagus following serutan[®] ingestion (ab), May, 768
- Significance of opaque medications in the gastrointestinal tract, with special reference to enteric coated pills (ab), March, 435
- HINSHAW, H. C.** See **GARLAND, L. H.**
- HIP**
- osteochondromatosis (ab), Ross Bloom and J. N. Pattinson, Jan., 150
- osteochondromatosis; case (ab), Gawad Hamada, Jan., 150
- traumatic dislocation; survey of 204 cases covering a period of 21 years (ab), Vernon P. Thompson and Herman C. Epstein, June, 908
- vascular epiphyseal changes in congenital dislocation; results in adults compared with results in coxa plana and in congenital dislocation without vascular changes (ab), William K. Massie, March, 464
- HIRSCHMAN, LOUIS J.:** Stereoscopic radiography in the diagnosis of anorectal fistula (ab), May, 772
- HISTOPLASMOSIS**
- pulmonary histoplasmosis; summary of data on reported cases and a report on 2 patients treated by lobectomy (ab), Corrin H. Hodgson, et al, Feb., 290
- HITZIG, W. H.** See **HEDINGER, CHR.**
- HODES, PHILIP J.** See **BRINEY, ALLAN K.**
- See **CHOUKE, KEHAR S.**
- HODGKIN'S DISEASE**
- Hodgkin's disease and pregnancy: review of literature and report of case (ab), William Teneblatt and Charles Horton, Feb., 315
- lymphogranulomatosis of bone (ab), A. Vogt, May, 777
- possibilities of combinations of chemotherapy and of radiotherapy (ab), R. Sarasin and H. Dubois-Ferrière, June, 917
- vertebral manifestations of malignant lymphoma, myeloid leukemia, and multiple myeloma (ab), Robert Mazet, Jr., March, 464
- HODGSON, CORRIN H., WEED, LYLE A., and CLAGETT, O. THERON:** Pulmonary histoplasmosis. Summary of data on reported cases and a report on two patients treated by lobectomy (ab), Feb., 290
- HÖFFKEN, W. and HEIM, G.:** Melorheostosis with bone sclerosis in right upper quadrant of the body, involvement of the skull, and skin changes (ab), Feb., 303
- HOLDEN, FRANCIS R., TOCHILIN, EUGENE, HINE, CHARLES H., and LEWIS, LEON:** Prevention of injury from x-radiation (ab), March, 478
- HOLMES, R. O., and LOVITT, W. V.:** Studies of the portal venous system by injection technique (ab), Feb., 311
- HOLT, JOHN F., and DICKERSON, WILLARD W.:** The osseous lesions of tuberous sclerosis (ab), Jan., 1
- HOMBURGER, F.** See **SHEN, SHU CHU**
- HONIG, EDWARD I., STEINBERG, ISRAEL, and DOTTER, CHARLES T.:** Innominate artery: angiocardigraphic study, Jan., 80
- HOOGERHYDE, JACK.** See **LOWMAN, ROBERT M.**
- HOPKINS, WILLIAM A.** See **ABBOTT, OSLER A.**
- HORGER, EUGENE L., DOTTER, CHARLES T., and STEINBERG, ISRAEL:** Electrocardiographic changes during angiocardigraphy (ab), March, 432
- HORMONES.** See Androgens; Estrogens; Thyroid
- HORN, ROBERT C., Jr.** See **FLETCHER, A. G., Jr.**
- HORRAX, GILBERT:** Chromophobe pituitary adenomas: Surgical and radiation treatment (ab), May, 789
- HORTON, CHARLES.** See **TENEBLATT, WILLIAM**
- HOSPITALS**
- chest survey in large general hospital (ab), Harold C. Ochsenr, March, 446
- HOUGHTON, JOHN D.** See **PETERSON, EDWIN W.**
- HOYNE, ROBERT M., and ROGERS, J. C. T.:** Esophageal fibromyoma associated with diverticulum (ab), May, 767
- HSIAO, S. C.** See **CHU, C. S.**
- HUDAK, ALBERT:** Accelerated transit through the intestine (ab), April, 607
- HUEBERT, D. W.** See **SCHMIDT, C. ROBERT**
- HUFF, REX L.** See **VAN DYKE, DONALD C.**
- HUGHES, F. A., Jr.** See **LOWRY, C. C.**
- HUGHES, J. P. W.** See **STEWART, ALICE**
- HUGHES, RICHARD R.** See **ZIPERMAN, H. HASKELL**
- HUNT, R. R.** See **ROCCO, ALBERT F.**
- HUNTER, CURWOOD R.** See **MAYFIELD, FRANK H.**
- HUNTER, JAMES S., Jr.** See **McLIN, THOMAS W.**
- HUNZINGER, W.** See **WASER, P.**
- HURLER'S DISEASE.** See Lipochondrodystrophy
- HURST, ALLEN, and LEVINE, MORRIS A.:** A new roentgen sign of broncho-extrapleural perforation in lucite plombage (ab), June, 894
- HURWITZ, SIDNEY, and McALENNY, PAUL F.:** Trichobezoar in children. Review of the literature and report of two cases (ab), June, 903
- HYALURONIDASE.** See Pycelography
- HYDE, BERNARD.** See **HYDE, LEROY**
- HYDE, LEROY, HYDE, BERNARD, and POKORNY, CHARLES:** Diffuse bilateral fibrocystic disease of lungs (honey-comb lungs) (ab), Jan., 133
- HYDE, XIMIE RICHARD (obit),** March, 432
- HYDROCEPHALUS**
- radiological and pathological aspects of tuberous sclerosis, with special reference to hydrocephalus (ab), David Sutton and L. A. Liversedge, March, 443
- tracer studies with radioactive phosphorus (³²P) on absorption of cerebrospinal fluid and problem of hydrocephalus (ab), John E. Adams, March, 477
- HYDROCOLPOS.** See Vagina
- HYDROTHORAX**
- interlobar hydrothorax in cardiac failure (ab), R. F. Robertson, Jan., 136
- HYOID BONE**
- anomalous hyoid: review of literature and report of case, Edmund W. Klinefelter, Feb., 224
- HYPEROSTOSIS, INFANTILE CORTICAL.** See Bones, pathology
- HYPEROSTOSIS, PROGRESSIVE CORTICAL.** See Bones
- HYPERTENSION.** See Blood Pressure
- HYPOCHLORHYDRIA.** See Stomach
- HYPOPHARYNX.** See Larynx

HYPOPHYSECTOMY; HYPOPHYSIS. See Pituitary Body
HYPOXIA. See Oxygen

HYSTERIA

—hysterical abdominal distention simulating acute intestinal obstruction; case (ab), Philip R. Westdahl, April, 607

HYSTEROSALPINGOGRAPHY. See Fallopian Tubes

I

IBERS, G., VIETEN, H., and WILLMANN, K. H.: Bronchography in tuberculosis (ab), May, 757

IDBOHRN, HANS: Angiographical diagnosis of carotid body tumors (ab), Jan., 128

ILEOCECAL VALVE

—prolapse of lower lip of valve into terminal ileum (ab), Leo G. Rigler and Elliott Lasser, May, 771

ILEUM.

See Intestines

IMERSLUND, OLGA. See ENGESET, ARNE

IMMATURITY

—effect of immaturity, hypophysectomy and adrenalectomy upon changes in blood plasma of rat during acute radiation syndrome (ab), Henry I. Kohn, March, 479

INCONTINENCE. See Urine and Urination

INDUSTRY AND OCCUPATIONS

diseases and poisoning. See also Pneumoconiosis
—mass radiography findings in Northamptonshire boot and shoe industry, 1945-6 (ab), Alice Stewart and J. P. W. Hughes, March, 446

INFANTS. See Children; Infants, Newborn

INFANTS, NEWBORN

—congenital intrinsic obstruction of stomach and duodenum in newborn (ab), Clifford D. Benson and John J. Coury, May, 769

—duodenal obstruction (ab), J. O. Tankin, March, 457

INGRAM, FRANK L.: Fibrous dysplasia of bone and comparable conditions in the jaws (ab), June, 907

INSTRUMENTS

—significance of pressure in hysterosalpingography; new instrument for measuring pressure (ab), C. Müller, May, 753

INSURANCE

—American College of Radiology announces group plan of disability income protection, June, 885.

INTERAMERICAN CONGRESS OF RADIOLOGY (FOURTH), March, 428

INTERNATIONAL CONGRESS OF RADIOLOGY (SEVENTH), April, 585

INTESTINES

See also Colon; Digestive System; Duodenum; Gastro-Intestinal Tract

—prolapse of lower lip of ileocecal valve into terminal ileum (ab), Leo G. Rigler and Elliott Lasser, May, 771

—pseudopolypos lymphatica ilei (pseudo-ileitis) (ab), J. Bucker and H. R. Feindt, Jan., 143

—small intestinal rupture due to non-penetrating abdominal injury: roentgenological studies (ab), George Jacobson and Ray A. Carter, June, 903

abnormalities. See Intestines, obstruction

cysts

—pneumatosis intestinalis in the newborn (ab), O. Arthur Stiennon, April, 607

—pneumatosis intestinalis: review of literature and report of 13 cases (ab), Ellen P. MacKenzie, May, 770

dilatation

—megacolon and dilatation of small bowel in parkinsonism (ab), Alexander Lewitan, et al, March, 458

—roentgen manifestations of acute intermittent porphyria, George L. Calvy and Carroll C. Dundon, Feb., 204

diverticula

—lithiasis of Meckel's diverticulum; case (ab), Alfredo R. Basile and Marcos Elfers, May, 773

—solitary diverticulum of ascending colon; case diagnosed before operation (ab), Boardman M. Bosworth and Frederick L. Landau, March, 457

gases in. See Flatulence

motility

—accelerated transit (ab), Albert Hudak, April, 607

—effect of x-irradiation on motility in rat (ab), Robert A. Comard, April, 633

—transit time through small intestine: roentgenologic study on normal variability (ab), Lars Lönnérblad, Jan., 142

obstruction. See also Intussusception

—congenital abnormalities of intestinal rotation and mesenteric attachment—cause of intestinal obstruction in the adult (ab), Robert B. Brown and Donald Ross, May, 770

—hysterical abdominal distention simulating acute obstruction; case (ab), Philip R. Westdahl, April, 607

—incomplete obstruction of small intestine (ab), Alexander Strelinger, Jan., 143

—radiologic experiences in true strangulating obstructions (ab), J. Frimann-Dahl, Jan., 143

pathology

—generalized scleroderma with intestinal involvement (ab), C. Barrington Prowse, May, 770

—porphyria; cause of non-specific small intestinal disturbance (ab), Samuel H. Fisher and Robert R. Stanley, May, 770

roentgenography

—roentgen features of non-malignant periappendiceal and ileocecal lesions (ab), Charles Gottlieb, et al, Feb., 297

—roentgenologic examination of colon, using drainage and negative pressure, with special reference to early diagnosis of neoplasm (ab), F. E. Templeton and E. A. Addington, Feb., 297

tumors

—multiple polyposis of small and large intestines with multiple intussusception; case (ab), Marshall N. Jensen, April, 606

—radiologic examination of small intestine by means of duodenal tube, especially for diagnosis of tumors (ab), A. Lurà, Feb., 296

—roentgen findings in 4 cases of small-intestinal tumor (ab), Karl Schaub, Feb., 296

volvulus

—of sigmoid colon (ab), R. M. Pool and W. David Dinnavaert, April, 608

INTUSSUSCEPTION

—in children under 2 years of age; analysis of 54 cases from Charity Hospital of Louisiana at New Orleans (ab), H. Reichard Kahle, April, 608

—in infancy and childhood (ab), Henry C. Cleveland, March, 457

—multiple polyposis of small and large intestines with multiple intussusception; case (ab), Marshall N. Jensen, April, 606

—roentgen diagnosis of ceco-colic tumor invagination (ab), H. Garbsch and B. Thurnher, Feb., 297

IODINE AND IODINE COMPOUNDS

See also Bronchi; Fallopian Tubes

—tumor-host studies. Alteration of thyroid, skin, blood, and tumor uptake of ¹³¹I-tagged diiodotyrosine in rats by transplanted tumors (ab), Kenneth G. Scott and Robert S. Stone, Feb., 320

radioactive. See Radioactivity; Thyroid

toxicity

—delayed death following intravenous administration of Diodrast (ab), Gaspar A. Gulotta and Harry Leavenbrook, Jan., 155

—delayed pulmonary complications of bronchography (ab), Philip W. Robertson and K. D. Forgan Morie, Jan., 131

—does Ioduron bronchography damage the lung parenchyma? Contribution to pathogenesis of granulomatous changes and xanthomatous and interstitial pneumonia in primary lung processes (ab), Hans U. Zollinger, May, 758

—effect of barbiturates and other drugs on mortality from Diodrast in the mouse (ab), H. Haskell Ziperman, et al, Feb., 311

—effects of Ioduron B on respiratory tree of guinea pigs (ab), N. M. Brown, et al, April, 622

di-iodo-fluorescein, radioactive. See Brain, tumors

diiodotyrosine. See Iodine and Iodine Compounds

IODURON B. See Iodine and Iodine Compounds

IRON

—iron metabolism in human pregnancy as studied with radioactive isotope, Fe⁵⁹ (ab), P. F. Hahn, et al, Feb., 318

—silicosis among iron foundry workers (ab), Saul Solomon, April, 603

radioactive. See Radioactivity

IRWIN, JAMES B.: Irradiation treatment of lymphoid hyperplasia of the nasopharynx (ab), March, 475

ISAZA B., JAIRÓ. See CEBALLOS, JORGE

ISORNI. See PRUVOST, P.

ISOTOPIES. See Radioactivity

ISRAELS, M. G.: Aneurysm of the pulmonary artery (ab), April, 621

IVINS, JOHN C. See JANES, JOSEPH M.

J

JACKMAN, RAYMOND J., CLARK, P. LEMON, III, and SMITH, NEWTON D.: Retrorectal tumors (ab), Feb., 298

—See MAYO, CHARLES W.

JACOBI, M. See VOLK, B. W.

JACOBSON, GEORGE, and CARTER, RAY A.: Small intestinal rupture due to non-penetrating abdominal injury. Roentgenologic studies (ab), June, 903

JACOBSON, H. R. See REPA, J. J.

JACOBSON, HAROLD G. See GUEST, C. MAYNARD

—See NEWMAN, WALTER

JACOBSON, L. O., SIMMONS, E. L., MARKS, E. K., GASTON, E. O., ROBSON, N. J., and ELDREDGE, J. H.: Further studies on recovery from radiation injury (ab), May, 796

JACOBSON, LILLIAN E., SCHWARTZMAN, JOEL J., and HEISER, SAUL: Monitoring of a diagnostic x-ray department, April, 568

JAKOB, A.: Contribution to the differential diagnosis of bone calcification, especially of the bony infarct (ab), Jan., 146

JAMES, ARTHUR G., WILLIAMS, ROGER D., and MORTON, JOSEPH L.: Radioactive cobalt as an adjunct to cancer surgery (ab), May, 794

JAMES, DAVID F. See WEENS, H. STEPHEN

JANES, E. C. See STAPLETON, J. G.

JANES, JOSEPH M., and IVINS, JOHN C.: A method of dealing with arterioleptic popliteal aneurysms (ab), Feb., 310

JAUBERT. See SANTY, P.

JAWS

See also Teeth

—fibrous dysplasia of bone and comparable conditions in the jaws (ab), Frank L. Ingram, June, 907

—function test in early x-ray diagnosis of diseases of mandibular joint (ab), H. Weingraber, Jan., 130

—roentgen studies of maxillae and mandible in sickle-cell anemia, Irwin B. Robinson and Bernard G. Sarnat, April, 517

JAWS—cont.

—roentgenographic study of edentulous jaws (ab), Ralph W. Edwards, June, 893

tumors

- (ab), William Campbell, April, 599
- (ab), John C. Glenn, Jr., et al, April, 599
- malignant tumors of upper jaw (ab), G. S. Seed, March, 445
- non-osteogenic fibroma (ab), C. Agazzi and L. Belloni, May, 780

JEJUNUM. See **Fistula; Intestines**

JENKINSON, E. L., NORMAN, R. C., and WILSON, J. A.: Radiation therapy of the non-traumatic painful shoulder, Feb., 192

JENNINGS, ROBERT. See **WHEELOCK, MARK C.**

JENNINGS, W. A.: Low voltage x-ray therapy with a beryllium window tube. Part II. Achievement of optimum depth dosage distributions—from the physical standpoint (ab), Feb., 316

—See **GREEN, ANTHONY**

JENSEN, MARSHALL N.: Multiple polyposis of the small and large intestines with multiple intussusception; report of a case (ab), April, 606

JODOL, JODOL. See **Fallopian Tubes**

JODURON. See **Bronchi; Fallopian Tubes**

JONSSON, GUNNAR, BRODÉN, BROR, and KARNELL, JOHAN: Thoracic aortography, with special reference to its value in patent ductus arteriosus and coarctation of the aorta (ab), June, 895

JOHNS, VARNER. See **ZINN, WILLARD J.**

JOHNSON, ALEXANDER C., and MEREDITH, JOHN M.: Suprasellar (Rathke's pouch) cyst. Report of unusual case simulating successively rheumatic fever, encephalitis, and brain-stem tumor; prolonged postoperative recovery and development of pubertas precoc (ab), Feb., 284

JOHNSON, ALLEN C. See **ROSS, JOHN R.**

JOHNSON, CLIFFORD C., HANSON, NORBERT O., and GOOD, C. ALLEN: Erythema nodosum: the possible significance of associated pulmonary hilar adenopathy (ab), March, 449

JOHNSTONE, ALAN S.: Diagnosis of early gastric herniation at the oesophageal hiatus (ab), June, 902

JOHNSTONE, HERBERT G. See **OBLATH, ROBERT W.**

JOINTS

See also under names of joints, as Hip; Shoulder; etc.
—application of technic of radiologic enlargement to the study of chronic articular affections (ab), G. J. van der Plaats and J. Fontaine, Jan., 151

—examination of articulations by means of contrast media (ab), G. F. Leroux, Feb., 301

—periarticular calcifications (ab), Giovanni Gardella, April, 613

—physiopathology of articulations (ab), Oct. Coquelet, Feb., 301

—rare form of malignant joint tumor (ab), Arnold Sonnen-schein, June, 920

—xanthomatous joint tumors (ab), W. L. Minear, March, 461

JONES, GEORGEANNA S. See **LEWISON, EDWARD F.**

JONES, HENRY H. See **WINDHOLZ, FRANK**

JONES, HOWARD W., Jr. See **LEWISON, EDWARD F.**

JORDAN, MICHAEL J.: Advances in the treatment of carcinoma of the cervix (ab), Feb., 313

JORGENSEN, JOSEPH. See **ADAMS, FORREST H.**

K

KAHLE, H. REICHARD: Intussusception in children under two years of age. Analysis of fifty-four cases from Charity Hospital of Louisiana at New Orleans (ab), April, 608

KAHN, ALFRED, Jr. See **LONERGAN, WARREN M.**

KALTREIDER, D. FRANK: Diagonal conjugate (ab), April, 619

Transverse diameter of the inlet (ab), May, 784

KAPLAN, ABRAHAM and UMANSKY, A. L.: Myelographic defects of herniated intervertebral discs simulating cauda equina neoplasms (ab), Feb., 305

KAPLAN, HENRY S. See **WINDHOLZ, FRANK**

KARNELL, JOHAN. See **JONSSON, GUNNAR**

KASTERT, J.: Tuberculoelastic treatment of foci in spinal tuberculosis (ab), April, 615

KASTNER, J., and GREENBERG, L.: Measurement of beta-ray applicators, May, 731

KEIL, PHILIP G., and LANDIS, S. N.: Peritoneoscopic cholangiography (ab), May, 773

KEIM, W. FRANKLIN, and LIVINGSTONE, ROBERT G.: Internal laryngocele (ab), Feb., 280

KEIRNS, MARVIN M.: Two unusual tumors of the diaphragm, April, 542

KELLY, KEITH H., FELDSTED, EGGERT T., BROWN, REYNOLD F., ORTEGA, PAUL, BIERMAN, HOWARD R., LOW-BEER, BERTRAM V. A., and SHIMKIN, MICHAEL B.: Irradiation of the normal human hypophysis in malignancy. Report of three cases receiving 8,100-10,100 r tissue dose to the pituitary gland (ab), Feb., 311

KELLY, ROBERT P., and MURPHY, FRED E.: Fatigue fractures of the tibia (ab), March, 465

KERBY, GRACE P. See **CALLAWAY, J. LAMAR**

KERBY, JAMES PHILIP (obit), April, 588

KERMAN, HERBERT D. See **BROADBENT, THOMAS R.**

KERR, H. DABNEY: Place of radiation in the treatment of intracranial tumors (ab), March, 471

KERR, WM. J. See **OBLATH, ROBERT W.**

KERWIN, R. W.: Juvenile nasopharyngeal angiofibroma (ab), Feb., 315

KESMODEL, KARL F., Jr. See **DONALD, DAN C., Jr.**

KESSEL, A. W. LIPMANN: Intrathoracic meningocele, spinal deformity, and multiple neurofibromatosis (ab), Jan., 135

KESTERSON, JOHN E. See **MCCLERY, ROBERT S.**

KEY, J. ALBERT. See **ODELL, RICHARD T.**

KEYES, T. F., WEGELIUS, C., and LIND, J.: Diagnostic value of dynamic studies in angiocardiology. Evaluation of new rapid technique (ab), Jan., 137

KIDNEYS

—dissecting aneurysm of abdominal aorta simulating renal disease; case diagnosed antemortem (ab), Henry A. Kontoff and Bernard R. Sears, Feb., 310

—distortion and displacement of renal pelvis and calices by extrarenal lesions (ab), J. O. Y. Cole, March, 467

—osteonephropathy in children (ab), J. James Cancelmo and Ralph S. Bromer, May, 777

—thorotrast in kidney 11 years after pyelography (ab), K. Breckoff, April, 619

blood supply

—attempt to measure renal circulation time with P³² (ab), H. D. Bruner, et al, Feb., 319

calcification

—calcinosis associated with parathyroid tumor: clinical and pathological study with case report (ab), Jack D. Kirschbaum and Hal T. Wilson, April, 620

—nephrocalcinosis (ab), William J. Engel, Jan., 153

—Sjögren's disease associated with a pulmonary lesion and nephrocalcinosis (ab), Maurice Nellen, April, 620

calculi

—etiology and differential diagnosis (ab), Vincent Vermooten, April, 620

—radiopaque renal calculus identified as cystine by x-ray diffraction, Jonathan Parsons, June, 878

cysts

—(ab), Harold C. Ochsner, Jan., 153

—congenital cystic dilatation of renal tubules: new disease entity (ab), Vincent Vermooten, April, 619

roentgenography. See also **Kidneys, tuberculosis; Pyelography**

—evaluation of surgical kidney employing translumbar aortography (ab), A. Keller Doss and Humberto A. Quirarte, Feb., 307

—evaluation of translumbar arteriography (ab), Parke G. Smith, et al, May, 785

—intravenous nephrography: method of roentgen visualization of kidney (ab), H. Stephen Weens, et al, Feb., 307

—roentgen demonstration of adrenals and kidneys by perirenal air insufflation (ab), F. Kokas and Z. Zsebök, Jan., 152

—translumbar aortography: its value in diagnosis, management and prognosis of renal pathology (ab), Watterson Reagan, June, 908

—urologic problems in pediatric x-ray diagnosis, Frederic N. Silverman, March, 325

tuberculosis

—in Newfoundland (ab), H. B. Murphy, April, 621

—intravenous urography (ab), Nils O. Ericsson and Åke Lindbom, March, 466

tumors

—diagnosis of involvement of inferior vena cava in renal neoplasms (ab), P. A. Duff and W. H. Granger, Feb., 308

—renal tumors: a round table discussion, Vincent J. O'Connor, Abram H. Cannon, Thomas C. Laipply, Kenneth Sokol, and Earl E. Barth, June, 830

—treatment of Wilms' tumor (ab), Carl Rusche, May, 790

—Wilms' tumor of infancy and childhood, William Benzing, Jr., May, 674

KING, DON, and SECOR, CHARLES: Bow elbow (cubitus varus) (ab), June, 907

KIPSHOVEN, H. J.: Discontinuities in the course of the first ribs (ab), April, 616

KIRKLIN, B. R. See **RUNGE, RAY K.**

KIRSCHBAUM, JACK D., and WILSON, HAL T.: Calcinosis of kidneys associated with parathyroid tumor: clinical and pathological study with case report (ab), April, 620

KIRTLEY, JAMES A. See **MCCLERY, ROBERT S.**

KISTIN, ALBERT D. See **COOKE, FRANCIS N.**

KISTNER, ROBERT W., and HERTIG, ARTHUR T.: Correlation of histologic grade, clinical stage, and radiation response in carcinoma of the uterine cervix (ab), April, 629

KITCHIN, IAN D.: An atypical case of infantile cortical hyperostosis (ab), April, 611

KJELBERG, SVEN R., LÖNROTH, HENRIK, and RUDHE, ULF: Effect of various factors on the roentgenological determination of the cardiac volume (ab), April, 604

KLASSEN, KARL P., MORTON, DOUGLAS R., and CURTIS, GEORGE M.: Clinical physiology of the human bronchi. III. Effect of vagus section on the cough reflex, bronchial caliber and clearance of bronchial secretions (ab), March, 445

KLEIN, M. See **MAIER, R. R.**

KLINEFELTER, EDMUND W.: The anomalous hyoid. Review of the literature and report of a case, Feb., 224

KLOPFER, F.: Protrusion acetabuli (Otto-Chrobak pelvis). Its pathogenesis and roentgen symptomatology (ab), Feb., 306

KLOSK, EMANUEL. See **BERNSTEIN, ARTHUR**

KLOSTERMYER, LOUIS L., and THOMPSON, JOHN J.: Radiographic diagnosis of hydrocolpos in infants, Jan., 100

- KNEAL, ELLSWORTH, and SANTE, L. R.:** Osteopetrosis (marble bones). Report of a case with special reference to early roentgenologic and pathological findings (ab), April, 612.
- KNEIDEL, JOHN H.:** Disseminated calcification of the pancreas: report of two cases (ab), Feb., 299.
- KNOEPP, LOUIS F.:** Unusual diaphragmatic hernia with displaced liver (ab), March, 459.
- KNOTT, J. M. S., and CHRISTIE, RONALD V.:** Radiological diagnosis of emphysema (ab), May, 758.
- KNOWLES, HARVEY C., FELSOW, BENJAMIN, SHAPIRO, NATHAN, and SCHIFF, LEON:** Emergency diagnosis of upper digestive tract bleeding by roentgen examination without palpation ("Hampton technic"), April, 536.
- KÖHLER, ROLF:** Roentgen treatment of cancer of the oesophagus (ab), Jan., 155.
- KOHN, HENRY I.:** Changes in composition of blood plasma of the rat during acute radiation syndrome, and their partial mitigation by dibenamine and cortin (ab), March, 478.
- Effect of immaturity, hypophysectomy and adrenalectomy upon changes in blood plasma of rat during acute radiation syndrome (ab), March, 479.
- KOKAS, F., and ZSEBOK, Z.:** Roentgen demonstration of adrenals and kidneys by perirenal air insufflation (ab), Jan., 152.
- KOLETSKY, SIMON, and CHRISTIE, JAMES H.:** Biologic effects of radioactive phosphorus poisoning in rats (ab), Feb., 319.
- KONTOFF, HENRY A., and SEARS, BERNARD R.:** Dissecting aneurysm of the abdominal aorta simulating renal disease: A case diagnosed ante-mortem (ab), Feb., 310.
- KOPPANG, KNUT:** Some examples of the diagnostic value of percutaneous carotid angiography (ab), Jan., 128.
- See **TORKILDSEN, A.**
- KOSZEWski, B. J.:** See **ESSELLIER, A. F.**
- KOTTMEIER, H. L.:** Studies of the dosage distribution in the pelvis in radium treatment of carcinoma of the uterine cervix according to the Stockholm method (ab), April, 629.
- KOVÁCS PROJECTION.** See **SPINE, INTERVERTEBRAL DISKS**
- KOZINN, PHILIP J.** See **CASAMAJOR, LOUIS**
- KOZMA, T.** See **ZSEBOK, Z.**
- KRAEFT, N. H.** See **LOWRY, C. C.**
- KRAUS, ALVIN R.** See **WEINBERG, JOSEPH**
- KRETSCHMER, HERMAN L.** See **SQUIRE, FAY H.**
- KREYBERG, LEIV, and DEVIK, FINN:** Observations on the skin reaction to the subcutaneous application of metallic polonium in mice (ab), April, 635.
- KRISS, JOSEPH P.:** Uptake of radioactive iodine after intravenous administration of tracer doses (ab), Feb., 317.
- KRÖKER, P.:** X-ray examination in lumbar disk prolapse by means of Kovács lumbo-inguinal projection (ab), April, 613.
- KRUSE, CHARLES A.** See **SNYDER, WILLIAM H., Jr.**
- KÜMMELL'S DISEASE.** See **SPINE**
- KUPKE, D. W.** See **GRIFFIN, A. CLARK**
- KUREIN, F.** See **NOWELL, STANLEY**
- KURTZ, L. D.** See **STOREY, CLIFFORD F.**
- KUSHLAK, SAMUEL D.:** Strangulated right diaphragmatic hernia with surgical cure (ab), May, 775.
- KYMOGRAPHY**
- contractile dysfunction of heart in kymography (ab), P. Stumpf, April, 605.
- fundamentals of interpretation in step kymography, William F. Wagner, May, 729.
- stenosis of isthmus of aorta: roentgenkymographic studies of normal and diseased hearts, the great vessels, and transmitted pulsations (ab), Alfred Vogt, Jan., 138.
- KYPHOSIS.** See **SPINE**
- L**
- LABOR.** See **Fetus; Pelvis, measurement**
- LABREE, JOHN W.** See **ADAMS, FORREST H.**
- LACHAPÈLE, A. P., and LAGARDE, CLAUDE:** Spondylolysis. Clinical radiological study of 43 cases (ab), April, 616.
- LACKEY, ROBERT W.:** Pulmonary adenomatosis (alveolar-cell tumors). Report of two cases, Feb., 215.
- LAFORET, EUGENE G., GREENLER, JOHN J., and O'BRIEN, EDWARD J., Jr.:** Acute appendicitis, with radiopaque appendiceal lithiasis (ab), May, 773.
- LAGARDE, CLAUDE.** See **LACHAPÈLE, A. P.**
- LAGERLÖF, H.** See **LARSSON, Y.**
- LAHEY, FRANK H., and HARE, HUGH F.:** Malignancy in adenoma of the thyroid (ab), Feb., 312.
- LAIDLAW, ROBERT W.** See **CASAMAJOR, LOUIS**
- LAIPPY, THOMAS C.** See **O'CONNOR, VINCENT J.**
- LAMBERT, EDWARD C.:** Single ventricle with a rudimentary outlet chamber. Case report (ab), Feb., 292.
- LAMBERTS, AUSTIN E.** See **FALLS, HAROLD F.**
- LAMINAGRAPHY.** See **Body Section Roentgenography**
- LANDAU, FREDERICK L.** See **BOSWORTH, BOARDMAN M.**
- LANDIS, S. N.** See **KEIL, PHILIP G.**
- LANDMAN, HEINZ R.:** The physician's task in the atomic explosion (ab), Feb., 324.
- LÁNG, B.** See **ZSEBOK, Z.**
- LARMON, WILLIAM A.** See **SHAFFER, SID J.**
- LARSEN, IVAR.** See **BRADFORD, CHARLES H.**
- LARSSON, Y., MANNHEIMER, E., MÖLLER, T., LAGERLÖF, H., and WERKÖ, L. A.:** Congenital pulmonary stenosis without overriding aorta. A clinical study (ab), June, 901.
- LARYNGOCLELE.** See **Larynx**
- LARYNX**
- internal laryngoclele (ab), W. Franklin Keim and Robert G. Livingstone, Feb., 286.
- CANCER**
- biological problems in x-ray therapy of intrinsic and extrinsic tumors (ab), A. Zuppinger, June, 913.
- functional results and permanence of cure following roentgen therapy of intralaryngeal carcinomas (ab), Jens Nielsen, June, 913.
- radiotherapy: observations on choice of treatment (ab), V. E. Negus, June, 913.
- roentgen rotation therapy in cancer of hypopharynx (ab), Inge Gynning, April, 624.
- roentgen therapy (ab), William Harris, June, 913.
- roentgen therapy (ab), Felix E. Leborgne, June, 913.
- roentgen therapy of carcinoma (ab), F. Baclesse, June, 913.
- LASSER, ELLIOTT.** See **RIGLER, LEO G.**
- LAUGHLIN, JOHN S.** See **GARRISON, HUGH**
- See **HARVEY, ROGER A.**
- LAWES, C. H. WICKHAM:** Some points in the management of varicose veins (ab), April, 622.
- LAWSON, DONALD E.** See **GAIN, DOUGLAS D.**
- LAWTON, STANLEY E., FILDES, CHARLES E., and SEIDMAN, LEON:** Cancer of the stomach (ab), Jan., 141.
- LEAD**
- absorption of 2-mev constant potential roentgen rays by lead and concrete, W. W. Evans, R. C. Cranke, K. A. Wright, and J. G. Trump, April, 560.
- lead poisoning in children: 5 cases, with special reference to pica (ab), N. F. Elliott Burrows, et al., Feb., 305.
- LEAVENBROOK, HARRY.** See **GULOTTA, GASPER A.**
- LEBLOND, C. P.** See **GROSS, J.**
- LEBOURNE, FELIX E.:** Roentgentherapy of cancer of the larynx (ab), June, 913.
- LECHENGER, GILBERT CECIL (obit),** March, 433.
- LEE, Y. C.** See **O'CONNELL, W. F.**
- LEGER, L., GALLY, L., ARVAY, N., OUDOT, J., and AUVERT, J.:** Portography. Technic and indications (ab), May, 787.
- LEGS.** See **Extremities**
- LEHMANN, C. F., and PIPKIN, J. L.:** Interstitial radium therapy. Description of a short intensive technic (ab), Feb., 316.
- LEHMANN, G., and LEICHER, F.:** Ossifying chondromatosis of the spine with secondary reticulosarcomatosis (ab), Jan., 149.
- LEHMANN, OTTO:** Problems of pathological fractures (ab), March, 461.
- LEICHER, F.** See **LEHMANN, G.**
- LEIGH, FRED F.** See **ABBOTT, OSLER A.**
- LEININGER, C. R., GIBSON, STANLEY, and POTTS, WILLIS J.:** Congenital pulmonary stenosis. Post-operative observations on two hundred and fourteen children (ab), March, 448.
- LEIOMYOMA.** See **Tumors, myoma**
- LE MELLETIER, J.** See **DAUMET, PH.**
- LEMERCIER, SE. PRUVOST, P.**
- LENS**
- See also **Cataract**
- experimental studies on early lens changes after roentgen irradiation. Exchange and penetration of radioactive indicators (Na^{24} , K^{42} , I^{131} , P^{32}) in normal and irradiated lenses of rabbits (ab), Ludwig von Sallmann and Beatrice D. Locke, March, 479.
- LEOPOLD, SIMON S.** See **RAPHAEL, ROBERT L.**
- LEPORE, MICHAEL J., GOLDEN, ROSS, and FLOOD, CHARLES A.:** Oral bantline, an effective depressor of gastrointestinal motility (ab), March, 455.
- LERICHE, RENÉ:** Causes of failure of suprarenalotomy and ganglionectomy in thrombo-angiitis obliterans on the basis of 898 operations (ab), Feb., 310.
- LÉRI'S MELORHEOSTOSIS.** See **Osteosclerosis**
- LEROUX, G. F.:** Examination of articulations by means of contrast media (ab), Feb., 301.
- LeROY, GEORGE V.** See **FIELDS, THEODORE**
- LESSES, MARK F.** See **FREEDBERG, A. STONE**
- LEUKEMIA**
- as possible complication of radiodermatitis (ab), Francis W. Lynch, Feb., 321.
- generalized herpes zoster: case following roentgen therapy, associated with chronic lymphatic leukemia, leukemia cutis and Mikulicz's syndrome (ab), Edward L. Bosworth, April, 632.
- titrated, regularly spaced radioactive phosphorus or spray roentgen therapy of leukemias (ab), Edwin E. Osgood, Feb., 314.
- vertebral manifestations of malignant lymphoma, myeloid leukemia, and multiple myeloma (ab), Robert Mazet, Jr., March, 464.
- LEUKOCYTES**
- life span of white blood cells as measured in irradiated parabiotic rats (ab), Donald C. Van Dyke and Rex L. Huff, April, 635.
- LEVEN, GEORGE, and VEALE, NORMAN C.:** Inadequacy of routine barium enema for the roentgenologic examination of the rectum (ab), May, 772.
- LEVI, J. ELLIOT.** See **LEWISON, EDWARD F.**

- LEVI, LEO M. (obit), May, 746
- LEVINE, MORRIS A. See HURST, ALLEN
- LEVINSON, ABRAHAM, and HARTENSTEIN, HANS: Intracranial calcification following pneumococcal meningitis (ab), March, 444
- LEVINSON, DAVID C. See ZINN, WILLARD J.
- LEVY, HAROLD: Roentgen therapy in lymphadenitis and sinusitis in childhood, with ten-year follow-up of 349 cases (ab), June, 916
- LEWES, DAVID: Diagnosis of aortic stenosis based on a study of 25 proved cases (ab), Jan., 138
- LEWIS, A. A. G., and SMART, J.: Diabetes insipidus with honeycomb lungs: presumed normochlosteraemic xanthomatosis (ab), Jan., 134
- LEWIS, HENRY M., HENSCHEL, EGBERT J., and FRUMESS, GERALD M.: Extramedullary plasmacytoma. Report of a case (ab), Feb., 314
- LEWIS, JAMES E., and POTTS, WILLIS J.: Obstructive emphysema with a defect of the anterior mediastinum. Report of a case (ab), March, 451
- LEWIS, LEON. See HOLDE, M., FRANCIS R.
- LEWISON, EDWARD F., LEVI, J. ELLIOT, JONES, GEORGE-ANNA, JONES, HOWARD W., Jr., and SILBERSTEIN, HANNAH E.: Tracer studies of radioactive sodium estrone sulfate (^{22}Na) in cases of advanced breast cancer (ab), April, 631
- LEWITAN, ALEXANDER, NATHANSON, LOUIS, and SLADE, WALTER R., Jr.: Megacolon and dilatation of the small bowel in parkinsonism (ab), March, 458
- LEZAMA, LUIS G. See ALLEN, HERBERT C., Jr.
- LIBBY, RAYMOND L. See ALLEN, HERBERT C., Jr.
- LICKLY, DAVID S., and CUTLER, CONDUCT W., Jr.: Mucocoele of the appendix (ab), April, 609
- LIND, J. See KEYES, T. F.
- LINDBLOM, K.: Discography of dissecting transosseous ruptures of intervertebral discs in the lumbar region (ab), May, 781
- LINDBOM, ÅKE. See ERICSSON, NILS O.
- LINDER, A.: Roentgen picture after lobectomy and pneumonectomy (ab), May, 765
- LINDERT, M. C. F. See PETERS, BRUNO J.
- LINDGREN, E.: Encephalography in cerebral atrophy (ab), March, 441
- BERGSTRÖM, L. and WIHMAN, G.: Treatment of multiple myelomata with radioactive phosphorus (ab), May, 793
- See DICHIORO, GIOVANNI
- LINDQVIST, INGE: Vertebral hemangioma with compression of the spinal cord. Report of a case treated with roentgen with good clinical results (ab), April, 630
- LINDSAY, DUNCAN D.: The organization of the computer system of x-ray case planning at the Lincolnshire Radiotherapy Centre, June, 850
- LIPODOL. See Bronchi, roentgenography
- LIPOCHONDRODYSSTROPHY
- atypical Hurler's disease, 3 cases, with discussion of differential diagnosis (ab), Gregers Thomsen and Jørgen Vesterdal, April, 613
- roentgen pattern of dysostosis multiplex (Pfaundler-Hurler disease) (ab), Rudiger Seyss, Jan., 147
- LIPOMA. See Tumors, lipoma
- LISCHI, GIANCARLO: Morphological-functional observations in dolichostigmoid. Seventy cases (ab), May, 772
- LITHOPECTION
- case report and survey, Samuel D. Hemley and Aaron Schwinger, Feb., 235
- LIVER
- diaphragmatic deformation (ab), G. S. Christie, April, 610
- effect of a carcinogenic azo dye on radiophosphorus turnover in rat-liver nuclei and cytoplasm (ab), A. Clark Griffin, et al, Feb., 320
- hepatic embolism: 20 year experience and analysis of 263 cases (ab), Michael E. DeBakey and Alton Ochsner, Feb., 300
- liver and spleen visualization by a simple roentgen contrast method (ab), Samuel Zelman, Jan., 144
- pyelographic deformity produced by hepatic abscess (ab), William M. Coppridge, et al, April, 621
- studies of portal venous system by injection technic (ab), R. O. Holmes and W. V. Lovitt, Feb., 311
- two cases of hepatosplenomegaly with thoracost, injected 16 and 14 years ago, respectively (ab), L. Arrieta-Sánchez, March, 458
- unusual diaphragmatic hernia with displaced liver (ab), Louis F. Kneupp, March, 459
- LIVERSEDE, L. A. See SUTTON, DAVID
- LIVESAY, JACKSON E., GRIFFIN, ERNEST P., and SHEERAN, DAN H.: Bicipital monster, Feb., 239
- LIVINGOOD, CLARENCE S. See MULLINS, J. FRED
- LIVINGSTONE, ROBERT F. See KEIM, W. FRANKLIN
- LOBECTOMY. See Lungs
- LOCKARD, VERNON M.: Lesions of the upper gastro-intestinal tract in infants and children, May, 696
- LOCKE, BEATRICE D. See von SALLMANN, LUDWIG
- LOEFFLER'S SYNDROME. See Lungs, pathology
- LÖNNERBLAD, LARS: Transit time through the small intestine. A roentgenologic study on normal variability (ab), Jan., 142
- LÖNNROT, HENRIK. See KJELLBERG, SVEN R.
- LOEVINGER, ROBERT: Depth dose curves for grids in x-ray therapy, March, 351
- LOEWENTHAL, KURT: Effect of roentgen rays on *Microsporum canis*. An in vitro study (ab), April, 636
- LONGERGAN, WARREN M., and KAHN, ALFRED, Jr.: Post-bulbar duodenal ulceration (ab), March, 457
- LONNGREN, DUDLEY H. See d'AVERSA, GENEROSO
- LOOS, D.: Treatment of hypertension (unsuccessful with roentgen irradiation of the carotid sinus) (ab), May, 791
- LOOSER-MILKMAN SYNDROME. See Bones
- LORENZ, EGON, CONGDON, CHARLES, and UPHOFF, DELTA: Modification of acute irradiation injury in mice and guinea-pigs by bone marrow injections, June, 863
- ESCHENBRENNER, ALLEN B., HESTON, WALTER E., and UPHOFF, DELTA: Mammary-tumor incidence in female C3H mice following long continued gamma irradiation (ab), Feb., 322
- LOSNER, S. See VOLK, B. W.
- LOTSPEICH, EDGAR S., Jr. See MAYFIELD, FRANK H.
- LOVE, ROSS B. See McCLEERY, ROBERT S.
- LOVELADY, SIM B. See McELIN, THOMAS W.
- LOVITT, W. V. See HOLMES, R. O.
- LOW-BEER, BERTRAM V. A. See KELLY, KEITH H.
- LOWENHAUPT, ELIZABETH. See GAINES, WALTER
- LOWMAN, ROBERT M., HOOGERHYDE, JACK, WATERS, LEVIN L., and GRANT, CONSTANCE: Traumatic chylothorax. Roentgen aspects of this problem (ab), March, 450
- LOWRY, C. C., KRAEFT, N. H., and HUGHES, F. A., Jr.: Blastomycosis of the lung (ab), May, 762
- LUBITZ, JOSEPH M. See PETERS, BRUNO J.
- LUCITE PLOMBAGE. See Tuberculosis, Pulmonary
- LUCKÉ, BALDUIN, RICCA, RENATO A., and PARPART, ARTHUR K.: Differential effects of roentgen rays on cell permeability and on cell cleavage. Experiments with egg cells of *Arbacia punctulata* (ab), Feb., 323
- LUDIN, M., and SCHEIDEGGER, S.: Roentgenologic and pathologic examinations of tumors in the region of the pancreas (ab), Feb., 298
- LUKE, JOSEPHUS C.: The deep vein valves. A venographic study in normal and postphlebotic states (ab), Feb., 310
- LUMBAGO
- less common x-ray findings in the sacroiliac joints with lumbago in women (ab), August Verhaegh, Jan., 150
- LUNGS
- See also Aneurysm, pulmonary; Bronchi; Bronchiectasis; Pleura; Respiration
- bullet tract in lung (ab), R. Pohl, Jan., 135
- does Joduron bronchography damage the lung parenchyma? Contribution to the pathogenesis of granulomatous changes and xanthomatous and interstitial pneumonia in primary lung processes (ab), Hans U. Zollinger, May, 758
- erythema nodosum: possible significance of associated pulmonary hilar adenopathy (ab), C. Clifford Johnson, et al, March, 449
- pulmonocardiac failure: case (ab), W. F. O'Connell and V. C. Lee, Feb., 291
- segmental distribution of shrinkage of parts of the lungs, with bronchiectasis formation (ab), Paul Ch. Schmid, Jan., 135
- abnormalities
- anomalous lobe of lung arising from esophagus (ab), Stephen L. Gans and Willis J. Potts, Feb., 288
- distribution of bronchi in gross anomalies of right upper lobe, particularly lobes subdivided by azygos vein and those containing pre-arterial bronchi, Edward A. Boyden, June, 797
- interlobar sequestration of lung associated with an abnormal pulmonary artery (ab), C. McDowell, et al, May, 764
- blood supply
- analysis of variations in bronchovascular patterns of middle lobe in 50 dissected and 20 injected lungs (ab), E. A. Boyden and C. J. Hamre, Jan., 130
- anomalies of pulmonary vessels and their surgical significance, with review of literature (ab), Charles W. Findlay, Jr., and Herbert C. Maier, March, 450
- contrast visualization of pulmonary vessels as an aid in early diagnosis of pulmonary neoplasms: case (ab), Robert A. Nabatoff, Jan., 132
- calcification
- nodal calcification and serious hemoptysis (ab), Mathey and Maunes, April, 603
- significance of calcification in coin lesions, Hans Abeles and Aaron D. Chaves, Feb., 199
- cancer. See also Bronchi, cancer
- (ab), A. Brunner, June, 894
- alveolar-cell tumor (ab), J. G. Stapleton and E. C. Janes, April, 603
- androgen therapy in control of pulmonary metastasis from adenocarcinoma of corpus uteri: case benefited by androgen therapy (ab), John H. Freed, et al, March, 474
- contrast visualization of pulmonary vessels as an aid in early diagnosis of pulmonary neoplasms: case (ab), Robert A. Nabatoff, Jan., 132
- experiences in diagnosis of carcinoma (ab), H. Anacker, Jan., 132
- follow-up study of lung-cancer suspects in mass chest x-ray survey (ab), Clarence L. Scamman, March, 446
- hypertrophic osteoarthropathy in carcinoma of lung (ab), John D. Pattison, Jr., et al, May, 779
- lipoid pneumonia (non-inhalation) in carcinoma of lung treated by radiotherapy (ab), S. J. De Navasquez, et al, May, 795

LUNGS, cancer—cont.

- lymphangitic carcinomatosis; 6 case reports and review of literature (ab), Theodore E. Hauser and Arthur Steer, March, 447
- most detectable internal cancer (ab), Richard H. Overholt, April, 602
- new method for treatment by means of artificial radioactivity (Zn^{65} and Au^{198}); first experimental and clinical studies (ab), J. H. Müller and P. H. Rossier, April, 626
- cavitation.** See also Tuberculosis, Pulmonary
 - exploration of pulmonary cavities by water-soluble contrast media for bronchography (ab), P. Oudet, Feb., 287
 - pulmonary mycoses—coccidioidomycosis and pulmonary cavitation; study of 92 cases (ab), William A. Winn, Feb., 290
- collapse.** See also Pneumothorax; Tuberculosis, Pulmonary
 - total left pulmonary atelectasis after bronchography (ab), K. Reinhardt, April, 600
- cysts**
 - cystic diseases (ab), J. D. Murphy and J. D. Piver, March, 447
 - diabetes insipidus with honeycomb lungs: presumed normocholesteremic xanthomatosis (ab), A. A. G. Lewis and J. Smart, Jan., 134
 - diffuse bilateral fibrocystic disease (honeycomb lungs) (ab), Leroy Hyde, et al, Jan., 133
- diseases.** See also Histoplasmosis; Pneumoconiosis; Pneumonia; Tuberculosis, Pulmonary
 - bronchogenic carcinoma as a differential diagnostic problem in pulmonary disease. Peripheral type: carcinoma arising from minor bronchi and bronchioles (ab), John H. Moyer and Alfred J. Ackerman, Feb., 288
 - maxillary sinusitis and the post-sinusitic lung syndrome in radiologic practice (ab), H. H. Weber, May, 764
 - pulmonary changes in fibrosis of pancreas (ab), Thomas Rosendal, March, 449
 - pulmonary manifestations of systemic diseases (ab), John W. Middleton, March, 449
 - Sjögren's disease associated with a pulmonary lesion and nephrocalcinosis (ab), Maurice Nellen, April, 620
 - suggestions for diagnostic study of patient with an abnormal x-ray shadow of the chest (ab), John F. Briggs, June, 893
- edema**
 - centrally caused edema (ab), Victor Buchtala, Jan., 134
- emphysema.** See Emphysema
- mycosis.** See also Blastomycosis; Coccidioidomycosis; Moniliasis
 - roentgen picture in cases of mycosis (ab), Nils F. Bothén, May, 761
- ossification.** See Pneumoconiosis
- pathology**
 - delayed pulmonary complications of bronchography (ab), Philip W. Robertson and K. D. Forgan Morie, Jan., 131
 - differential diagnosis of transient lung infiltration with eosinophilia (Loeffler's syndrome) (ab), A. F. Essellier and B. J. Koszewski, May, 764
 - Loeffler's syndrome: transient pulmonary infiltration with eosinophilia (ab), Charles A. Heiken and E. Robert Wiese, Feb., 290
 - pulmonary changes following cholecystectomy (ab), Isadore Rudnikoff and Courtenay I. Headland, June, 896
 - pulmonary shadows in Q-fever (ab), R. Glauner, May, 762
- roentgenography**
 - bizarre pulmonary manifestations in heart disease (ab), Walter Newman and Harold G. Jacobson, June, 896
 - bronchogenic carcinoma masquerading as other diseases: review of 200 cases (ab), J. K. Poppe, June, 895
 - coin lesions (ab), Daniel L. Fink, May, 762
 - observations on division of adhesions in opaque lobes (ab), Alfred J. Coello, Jan., 133
 - "positive sputum" without pulmonary tuberculosis: pitfalls of positive sputum interpretation, with 8 clinic-roentgen observations (ab), Louis Schneider and Daniel Widelock, April, 602
 - roentgen anatomy (ab), G. Herrnheiser, May, 757
 - roentgen picture after lobectomy and pneumonectomy (ab), A. Linder, May, 765
 - roentgenographic methods in pulmonary disease (ab), Abraham G. Cohen and Abraham Geffen, Feb., 287
 - significance and management of peripheral pulmonary masses (ab), Osler A. Abbott, et al, April, 602
 - significance of calcification in pulmonary coin lesions, Hans Abels and Aaron D. Chaves, Feb., 199
 - standardized oblique roentgenography of chest (ab), Sherman W. Atwell, April, 606
 - surgical treatment of circumscribed intrathoracic lesions: lesions found on routine thoracic roentgen examinations, with absence of subjective symptoms (ab), Stuart W. Harrington, May, 762
- syphilis**
 - case confirmed at autopsy (ab), E. Vogler, Jan., 134
- tumors**
 - adenomatosis (alveolar-cell tumors); 2 cases, Robert W. Lackey, Feb., 215
 - adenomatosis; 2 cases (ab), Edwin W. Peterson and John D. Houghton, Feb., 289
 - primary solitary neurogenic tumors (ab), Walter Diveley and Rollin A. Daniel, Jr., Jan., 132
 - solitary adenoma (focal pulmonary adenomatosis): 3-year follow-up after resection (ab), George P. Rosemond, et al, May, 762
 - solitary tumors (ab), Donald B. Effler, Feb., 289

- spontaneous pneumothorax from secondary sarcoma of lung (ab), A. Batty Shaw, Jan., 132
- LURA, A.:** Radiologic examination of the small intestine by means of the duodenal tube, especially for the diagnosis of tumors (ab), Feb., 296

LYMPH NODES

- erythema nodosum: possible significance of associated pulmonary hilar adenopathy (ab), C. Clifford Johnson, et al, March, 449
- esophagus and mediastinal lymphadenopathy in bronchial carcinoma, Felix G. Fleischner, Jan., 48
- exacerbation of calcified lymph nodes of neck and its roentgen identification (ab), H. Bruger, June, 893
- possibilities of combinations of chemotherapy and of radiotherapy (ab), R. Sarasin and H. Dubois-Ferrière, June, 917
- pseudopolypoid lymphatic ilei (pseudoleititis) (ab), J. Buckner and H. R. Feindt, Jan., 143
- roentgen therapy in lymphadenitis and sinusitis in childhood, with 10-year follow-up of 349 cases (ab), Harold Levy, June, 916

LYMPHANGIOMA. See Tumors, angioma**LYMPHATIC SYSTEM**

- reflux of intestinal chyle in lymphatics of leg (ab), Servelle and Deysson, Jan., 154

LYMPHOBLASTOMA. See Sarcoma, lymphosarcoma**LYMPHOGRANULOMATOSIS.** See Hodgkin's Disease**LYMPHOID TISSUE**

- See also Nasopharynx
- lymphoid lesions in poliomyelitis (ab), Sheldon C. Sommers, et al, April, 636

LYMPHOMA. See Hodgkin's Disease**LYMPHOSARCOMA.** See Sarcoma, lymphosarcoma**LYNCH, FRANCIS W.:** Leukemia as a possible complication of radiodermatitis (ab), Feb., 321**M**

- McAlLENY, PAUL F.** See HURWITZ, SIDNEY
- McBRIDE, ANDREW F., Jr.:** Benign polypoid tumor of the esophagus (ab), June, 901
- MacBRYDE, CYRIL M.** See SWEENEY, BERNARD J.
- McCLEERY, ROBERT S., KESTERSON, JOHN E., KIRTLEY, JAMES A., and LOVE, ROSS B.:** Subclavian and anterior scalene muscle compression as a cause of intermittent obstruction of the subclavian vein (ab), April, 621
- McCLELLAN, G. S.** See HAHN, P. F.
- McCORMICK, NORMAN A.:** Diagnosis of early cancer of the large bowel and rectum (ab), April, 607
- McCOY, HERBERT I., STEINBERG, ISRAEL, and DOTTER, CHARLES T.:** Angiocardiographic findings in thoracoplasty, artificial pneumoperitoneum, and phrenicoclastia (ab), Jan., 137
- See STEINBERG, ISRAEL
- McCULLAGH, E. PERRY.** See CRILE, GEORGE, Jr.
- McCULLOUGH, J. A. L.** See STEEN, OLIVER T.
- McDONALD, LAWSON.** See SEMPLE, ROBERT
- McDOWELL, C., ROBB, DOUGLAS, HINDS, J. R., and NICKS, ROWAN:** Case of intralobar sequestration of the lung associated with an abnormal pulmonary artery (ab), May, 764
- MACDUFF, R. BRUCE (obit).** Jan., 119
- McELIN, THOMAS W., LOVELADY, SIM B., BRANDES, ROBERT W., HUNTER, JAMES S., Jr., and GOOD, C. ALLEN:** A preliminary evaluation of Cave's roentgenographic method of fetal cephalometry (ab), Feb., 307
- McGOVERN, FRANCIS H.:** Rhinological aspects of chronic dacryocystitis (ab), May, 759
- McGUIRE, JOHNSON.** See HELMSWORTH, JAMES A.
- MacKENZIE, ELLEN P.:** Pneumatosis intestinalis. Review of the literature with report of 13 cases (ab), May, 770
- McKIBBEN, BYRON G., and CASEY, ERNEST R., Jr.:** Orbitoethmoidal osteoma, (ab), March, 445
- McKINLAY, C. A.:** Transient periods of cardiac enlargement associated with hypersensitivity to different etiologic agents. Report of a case (ab), June, 897
- MACLAGAN, N. F.** See FOOTE, J. B.
- McMICHAEL, J., and MOUNSEY, J. P. D.:** A complication following coronary sinus and cardiac vein catheterization in man (ab), June, 899
- MADANSKY, L., and RASETTI, F.:** Continuous γ -radiation of β -emitters. Letter to the editor (ab), April, 632
- MADDOCK, WALTER G.** See TREMAINE, MYRON J.
- MAFFUCCI'S SYNDROME.** See Dyschondroplasia
- MAGILL, H. KELVIN.** See AITKEN, ALEXANDER P.
- MAIER, HERBERT C.** See FINDLAY, CHARLES W.
- MAIER, R. R., and KLEIN, M.:** Carcinoma of the cervix in pregnancy (ab), Jan., 156
- MAISEL, BERNARD, and WEINTRAUB, SIDNEY:** Prolapsed gastric mucosa through gastrojejunostomy simulating cancer of the stomach (ab), April, 606
- MALETSKOS, C. J.** See CATON, WILLIAM L.
- MALIS, LEONARD.** See COHEN, IRA
- MAMONAS, CHRISTOPHER.** See HESLIN, JOHN E.
- MANDIBLE.** See Jaws
- MANGELSDORFF, BERNHARD:** Bronchial carcinoma on a background of chronic inflammation (ab), Feb., 289
- MANNES.** See MATHEY
- MANNHEIMER, E.** See LARSSON, Y.
- MANSUY, MATTHEW M.** See GLUSHIEN, ARTHUR S.
- MANUBRIUM.** See Sternum
- MARBLE BONES.** See Osteosclerosis fragilis

- MARCH FRACTURE.** See Tibia
- MARION, P.** See PAPILLON, J.
- MARKS, E. K.** See JACOBSON, L. O.
- MARKS, HIRSCH:** Clinical experience with irradiation through a grid, March, 335
- MARKS, MARK M.:** Barium modification with Methocel (ab), Feb., 294
- MARKS, MATTHEW O., and ZIMMERMAN, H. A.:** Roentgen and differential diagnosis of chronic cor pulmonale (ab), June, 896
- MARMIER, C.** See HEDINGER, CHR.
- MARQUES, P.** See DUCUING, J.
- MARQUIS, R. M.:** Unipolar electrocardiography in pulmonary stenosis (ab), Jan., 139
- MARSHALL, SAMUEL F., and MEISSNER, WILLIAM A.:** Leiomyoma of the stomach (ab), May, 769
- MARTIN, HAYES, DEL VALLE, BERNARDO, EHRlich, HARRY, and CAHAN, WILLIAM G.:** Neck dissection (ab), April, 625
- MARTIN, JOHN.** See ASHKENAZY, MOSES
- MARTIN, M.** See HAHN, P. F.
- MARTIN, P. L.:** Bronchographic study of dyspnea (ab), May, 758
- MASS SURVEYS**
See also Tuberculosis, Pulmonary
—follow-up study of lung-cancer suspects in mass chest x-ray survey (ab), Clarence L. Scamman, March, 446
—mass radiography in the South Wales valleys (ab), T. A. Blyton, Jan., 135
—secondary radiation limits in photofluorography (ab), Willard W. Van Allen, April, 633
- MASSIE, WILLIAM K.:** Vascular epiphyseal changes in congenital dislocation of the hip. Results in adults compared with results in coxa plana and in congenital dislocation without vascular changes (ab), March, 464
- MASTOID**
—some experiences in management of cancer of middle ear and mastoid (ab), Walter L. Mattick and John W. Mattick, April, 623
- MATHEWS, W. H.** See BROWN, N. M.
- MATHEY, and MANNES:** Nodal calcification and serious hemoptysis (ab), April, 603
- MATTICK, JOHN W.** See MATTICK, WALTER L.
- MATTICK, WALTER L., and MATTICK, JOHN W.:** Some experiences in management of cancer of middle ear and mastoid (ab), April, 623
- and MEEHAN, DONALD J.: Carcinoma of the gum (ab), April, 624
- MATTSSON, OVE:** Flexible indicator for use in connection with radiation therapy (ab), March, 476
- MATZNER, MILTON J., RAAB, ADOLPH P., and SPEAR, PAUL W.:** Benign giant gastric rugae complicated by submucosal gastric carcinoma. Report of case (ab), May, 769
- MAXFIELD, J. R., Jr.:** Pneumoperitoneum in the study of pelvic structures (ab), May, 783
- MAXILLARY BONE.** See Jaws
- MAXILLARY SINUS**
—maxillary sinusitis and the post-sinusitis lung syndrome in radiologic practice (ab), H. H. Weber, May, 764
—sclerosis of antrum (ab), Samuel L. Fox and Edward A. Newell, Feb., 285
- MAY, ROBERT J. (obit),** Feb., 276
- MAYFIELD, FRANK H., LOTSPEICH, EDGAR S., Jr., SIMPSON, JAMES R., and HUNTER, CURWOOD R.:** Cerebral angiography (ab), Jan., 128
- MAYO, CHARLES W., DEWEERD, JAMES H., and JACKMAN, RAYMOND J.:** Diffuse familial polyposis of the colon (ab), June, 903
- MAZET, ROBERT, Jr.:** Vertebral manifestations of malignant lymphomas, myeloid leucemia, and multiple myeloma (ab), March, 464
- MEAD, JOHN J.** See WOLFFERTH, CHARLES C.
- MECKEL'S DIVERTICULUM.** See Intestines, diverticula
- MECONIUM**
—meconium peritonitis (ab), George B. Packard and Levi E. Reynolds, March, 459
- MEDIASTINUM**
See also Emphysema; Lymph Nodes
—cysts of embryologic origin (ab), Howard P. Doub, April, 604
—obstructive emphysema with a defect of anterior mediastinum; case (ab), James E. Lewis and Willis J. Potts, March, 451
- tumors**
—aortic deformity simulating mediastinal tumor: a subclinical form of coarctation (ab), Carlton R. Souders, et al, June, 900
—cardiospasm simulating mediastinal tumors (ab), Herbert M. Perr, March, 456
—cystic lymphangioma (ab), P. Santy, et al, Feb., 291
—encapsulated pleural effusion simulating tumor; 2 cases, Clifford F. Storey, March, 408
—rationale of modern diagnostic approach (ab), Osler A. Abbott, May, 766
—simulating left ventricular enlargement: diagnosis by means of angiocardiology (ab), Giovanni Di Chiro, March, 451
—teratoma (ab), Frank T. Fralick and Hugh S. Welsman, Jan., 135
- MEEHAN, DONALD J.** See MATTICK, WALTER L.
- MEGACOLON.** See Colon
- MEIGS, JOE V.:** Results of surgical treatment of cancer of the cervix uteri (ab), April, 627
- See STURGIS, SOMERS H.
- MEISSNER, WILLIAM A.** See MARSHALL, SAMUEL F.
- MELANOMA.** See Tumors, melanoma
- MELICK, WILLIAM F.** See BYRNE, JOHN E.
- MELORHEOSTOSIS.** See Osteosclerosis
- MENINGES**
See also Arachnoid
—astrocytoma Grade III associated with profuse subarachnoid bleeding as its first manifestation; case (ab), Richard L. DeSaussure, Jr., et al, Feb., 284
—intracranial calcification following pneumococcal meningitis (ab), Abraham Levinson and Hans Hartenstein, March, 444
—treatment of spontaneous subarachnoid hemorrhage (ab), Lester A. Mount, June, 892
- MENINGOCELE**
—anterior sacral meningocele, Robert J. Calihan, Jan., 104
—intrathoracic meningocele; case, Sidney Rubin and Edward H. Strateimer, April, 552
—intrathoracic meningocele, spinal deformity, and multiple neurofibromatosis (ab), A. W. Lipmann Kessel, Jan., 135
- MERCURY**
—lost in gastro-intestinal tract; unusual case (ab), Meyer O. Cantor, May, 768
- MEREDITH, JOHN M.** See JOHNSON, ALEXANDER C.
- MESCHAN, ISADORE, EDWARDS, RAYMOND R., and ROSENBAUM, PAUL:** Practical physical aspects in the use of radioactive cobalt 60 as a radium substitute (ab), Jan., 158
- MESSINGER, WILLIAM J.** See PARISER, SANFORD
- METABOLISM.** See Iron; Thyroid
- METASTASES.** See Cancer; Bones, cancer; Lungs, cancer; Lymph Nodes
- METHOCEL.** See Barium; Bronchi, roentgenography
- MÉTRAS, H., CHARPIN, J., GRÉGOIRE, M., and GAILLARD, C.:** Lipiodol vs. water-soluble media for bronchography (ab), Feb., 287
- MÉTRAS CATHETERS.** See Bronchi, roentgenography
- MEYER, ANDRE.** See BERNARD, ETIENNE
- MEYER, LORENTZ.** See FISCHER, F. K.
- MEYER, RALPH R.:** Air-contrast study of the duodenal bulb. Its importance in the diagnosis of duodenal ulcer, March, 393
- MEYER-KRAHMER, HANS-GEORG:** Broadening of the innominate artery (truncus brachiocephalicus) (ab), Jan., 154
Esophageal changes in epidermolysis bullosa hereditaria dystrophica (ab), May, 768
- MICORADIOGRAPHY**
—equipment for microradiography with soft roentgen rays (ab), A. Engström and L. Westedt, April, 622
- MICTURITION.** See Urine and Urination
- MIDDLETON, A. W.:** Post-caval ureter: a case preoperatively diagnosed with confirmation at surgery (ab), Feb., 308
- MIDDLETON, JOHN W.:** Pulmonary manifestations of systemic disease (ab), March, 449
- MIGRAINE**
—migraine headache: analysis of 124 cases treated by head-traction manipulation and thiamin chloride (ab), Murray M. Braaf, Feb., 305
—pathogenesis of ophthalmoplegic migraine (ab), Bernard J. Alpers and H. Edward Yaskin, March, 445
- MIKULICZ'S SYNDROME**
—generalized herpes zoster; case following roentgen therapy, associated with chronic lymphatic leukemia, leukemia cutis and Mikulicz's syndrome (ab), Edward L. Bosworth, April, 632
- MILCH, HENRY:** Triphalangeal thumb (ab), June, 908
- MILKMAN, LOUIS A. (obit),** Jan., 120
- MILKMAN'S SYNDROME.** See Bones, diseases
- MILLEN, J. L. E.:** Results of treatment of bladder cancer by radiotherapy (ab), March, 474
- MILLER, A.** See BROWN, N. M.
- MILLER, ALFRED O.:** X-ray examination of the spine (ab), May, 780
- MILLER, B. F.:** Congenital posterior bowing of the tibia with talipes calcaneo-valgus (ab), Jan., 151
- MILLER, EARL R.:** Device for immobilizing children during radiographic examinations, March, 421
- See GARLAND, L. H.
- MILLER, H., and WILSON, G. M.:** Measurement of blood flow by the local clearance of radioactive sodium (ab), March, 478
- MILLER, THEODORE R.** See PACK, GEORGE T.
- MILLER, WILLIAM B.** See PATTISON, JOHN D., Jr.
- MINER, W. L.:** Xanthomatous joint tumors (ab), March, 461
- MIRICK, D. F.** See RANDALL, J. H.
- MITCHELL, JACK H., Jr.** See SKIPPER, HOWARD E.
- MITCHELL, ROGER S.:** Artificial pneumothorax: statistical analysis of 557 cases initiated in 1930-1939 and followed in 1949. I. Influence of clinical findings before induction on early and late results. II. Fate of the contralateral lung. III. Influence of features of management after induction on early and late results (ab), May, 759
- MITRAL VALVE**
—stenosis without clinically demonstrable auricular enlargement (ab), Sanford Pariser, et al, March, 454
- MÖLLER, T.** See LARSSON, Y.
- MOLHAN, LYNDALE.** See ZATUCHNI, JACOB

MONILIASIS

—pulmonary moniliasis (ab), Robert W. Oblath, et al, June, 894

MONOPHEN. See Gallbladder, roentgenography

MONSTERS

—bicephalic monster; case report, Jackson E. Livesay, Ernest P. Griffin and Dan H. Sheeran, Feb., 239

MOORE, H. D.: Deep venous valves in the aetiology of varicose veins (ab), June, 909

MOORE, SHERWOOD: Osteitis deformans. Theory of its etiology (ab), March, 460

MORETON, ROBERT D., and EHNI, GEORGE: Radiographic findings in protruded cervical discs (ab), May, 781

MORGAN, RUSSELL H., and STEWART, HAL B.: Clinical experience with Telepaque, a new gallbladder compound, Feb., 231

MORLE, K. D. FORGAN. See ROBERTSON, PHILIP W.

MORRIS, HAROLD P. See WEISBURGER, JOHN H.

MORRISON, A. See DIXON, W. R.

MORRISON, J. W. See PHILLIPS, J. R.

MORRISON, LEWIS F.: Radiocobalt in otolaryngology (ab), Jan., 158

MORTON, DOUGLAS R. See KLASSEN, KARL P.

MORTON, JOHN J.: Organ-displacing abdominal tumors (ab), April, 623

MORTON, JOSEPH L., BARNES, ALLAN C., CALLENDINE, GEORGE W., Jr., and MYERS, WILLIAM G.: Individualized interstitial irradiation of cancer of the uterine cervix using cobalt 60 in needles, inserted through a lucite template. Progress report (ab), April, 628

—See JAMES, ARTHUR G.

MOSBERG, WILLIAM H., Jr.: Spinal tumors diagnosed during the first year of life, with report of a case (ab), Feb., 306

—See BLACKWOOD, W.

—See CARINS, HUGH

MOSEKILDE, EYVIND: Results of treatment of skin cancer with ultrasoft roentgen rays given in a single dose (ab), May, 789

MOSES, CAMPBELL. See BOATMAN, JOSEPH B.

MOTTRAM, M. E. See GARLAND, L. H.

MOULDER, PETER V. See ALLAN, J. GARROTT

MOUNSEY, J. P. D. See MCMICHAEL, J.

MOUNT, LESTER A.: Treatment of spontaneous subarachnoid hemorrhage (ab), June, 892

MOYER, JOHN B., and HILLER, GLENN I.: Cardiac aneurysm: clinical and electrocardiographic analysis (ab), Feb., 292

MOYER, JOHN H., and ACKERMAN, ALFRED J.: Bronchogenic carcinoma as a differential diagnostic problem in pulmonary disease. II. Carcinoma arising from major bronchi complicated by secondary infection (ab), Feb., 288

Bronchogenic carcinoma as a differential diagnostic problem in pulmonary disease. III. Peripheral type: carcinoma arising from the minor bronchi and bronchioles (ab), Feb., 288

MUCOCLE. See Appendix; Sinuses, Paranasal

MÜLLER, C.: Significance of pressure in hysterosalpingography; a new instrument for measuring pressure (ab), May, 783

MUELLER, C. BARBER. See ODELL, RICHARD T.

MÜLLER, G. M., and SISSONS, H. A.: Case of renal rickets simulating "metaphyseal dysostosis" (ab), April, 613

MÜLLER, J. H., and ROSSIER, P. H.: New method for the treatment of cancer of the lungs by means of artificial radioactivity (Zn^{65} and Au^{198}). First experimental and clinical studies (ab), April, 626

MUELLNER, S. RICHARD: Physiology of micturition (ab), May, 784

MULLINS, J. FRED, and LIVINGOOD, CLARENCE S.: Maffucci's syndrome (dyschondroplasia with hemangiomas): A case with early osseous changes (ab), Feb., 304

MULRY, W. C., and DUDLEY, H. C.: Studies of radiogallium as a diagnostic agent in bone tumors (ab), Jan., 158

MUNN, J. I., WALTERS, R. H., and DUDLEY, H. C.: Urinary excretion of gallium by man and animals (ab), May, 794

MURPHY, FRED E. See KELLY, ROBERT P.

MURPHY, H. B.: Some observations on renal tuberculosis in Newfoundland (ab), April, 621

MURPHY, J. D., and PIVER, J. D.: Cystic disease of the lung (ab), March, 447

MURPHY, LOIS. See FRIEDMAN, SIDNEY

MURPHY, WALTER T., and BERENS, DAVID L.: Late sequelae following cancericidal irradiation in children. Report of three cases, Jan., 35

MUSCLES

—See also Dystrophy, muscular

—consistency of clearance of radioactive sodium from human muscle (ab), L. H. Wisham, et al, June, 920

—subclavius and anterior scalene muscle compression as cause of intermittent obstruction of subclavian vein (ab), Robert S. McCleery, et al, April, 621

MUSKAT, D. A., and FINDLAY, M.: Osteomyelitis due to Friedländer's bacillus (ab), May, 779

MYCOSIS. See Lungs

MYELOGRAPHY. See Spinal Canal Roentgenography; Spine

MYELOMA. See Bones, marrow; Tumors, plasmacytoma

MYERS, WILLIAM G. See MORTON, JOSEPH L.

—See WISEMAN, BRUCE K.

MYOCARDIUM. See Heart

MYOPATHY. See Dystrophy

MYXEDEMA

—angular dorsolumbar kyphosis as an unrecognized skeletal sign of congenital myxedema (ab), W. Swoboda, Jan., 149

N

NABATOFF, ROBERT A.: Contrast visualization of the pulmonary vessels as an aid in the early diagnosis of pulmonary neoplasms. Case report (ab), Jan., 132

NADLER, N. J. See GROSS, J.

NAHON, JOSEPH R., and NAIDORF, CARROL P.: Comparative study of x-ray transmission in thorax and abdomen in living subjects, Feb., 241

NAIDORF, CARROL P. See NAHON, JOSEPH R.

NASH, FRANCIS P. See SMOLIK, EDMUND A.

NASOPHARYNX

—irradiation: relative merits of roentgen and radium therapy for benign conditions (ab), L. H. Garland, et al, May, 791

—irradiation treatment of lymphoid hyperplasia (ab), James B. Irwin, March, 475

—juvenile nasopharyngeal angiofibroma (ab), R. W. Kerwin, Feb., 315

NATHANSON, LOUIS. See LEWITAN, ALEXANDER

—See VOLK, B. W.

NATIONAL BUREAU OF STANDARDS

—Circular 507, X-ray Calibration of Radiation Survey Meters, Pocket Chambers, and Dosimeters, April, 586

—Handbook 41, Medical X-Ray Protection up to Two Million Volts, Jan., 116

—Handbook 47, Recommendations of International Commission on Radiological Protection and of International Commission on Radiological Units, 1950, Feb., 274

—Handbook 48, Control and Removal of Radioactive Contamination, April, 586

—Handbook 49, Recommendations for Waste Disposal of Phosphorus-32 and Iodine-131 for Medical Users, April, 586

NAVICULAR BONE. See Scaphoid Bone, Carpal

NECK

—See also Lymph Nodes

—dissection (ab), Hayes Martin, et al, April, 625

NEERKEN, A. J. See PECK, MORDANT E.

—See SALZMAN, EMANUEL

NEGROES

—cleidocranial dysostosis syndrome; case in Negro child exhibiting retarded growth (ab), Roland B. Scott and L. Otto Banks, March, 462

NEGUS, V. E.: Radiotherapy in cancer of the larynx (ab), June, 913

NELLEN, MAURICE: Sjögren's disease associated with a pulmonary lesion and nephrocalcinosis (ab), April, 620

NEPHROCALCINOSIS. See Kidneys

NEPHROGRAPHY. See Kidneys

NEPTUNE, WILFORD B. See WU, JACK FOY

NERVES

—chronic hypertrophic spondylitis of cervical spine with compression of spinal cord and nerve roots (ab), Joseph A. Epstein and Leo M. Davidoff, June, 907

—diagnostic and therapeutic nerve blocks: necessity for roentgenograms (ab), John W. Pender and David G. Pugh, May, 787

—neurogenous tumors within thorax: clinico-pathological evaluation of 48 cases (ab), Lauren V. Ackerman and Frederick H. Taylor, June, 895

VAGUS. See also Peptic Ulcer

—clinical physiology of human bronchi. Effect of vagus section on cough reflex, bronchial caliber, and clearance of bronchial secretions (ab), Karl P. Klassen, et al, March, 445

NERVOUS SYSTEM

—neurogenous tumors within thorax: clinico-pathological evaluation of 48 cases (ab), Lauren V. Ackerman and Frederick H. Taylor, June, 895

NEURALGIA

—pterygo-alar bar and its recognition by roentgen methods in trigeminal neuralgia (ab), Kehar S. Chouk and Philip J. Hodes, Jan., 130

NEURINOMA. See Tumors, neurinoma

NEUROFIBROMA. See Neurofibromatosis; Tumors, neurofibroma

NEUROFIBROMATOSIS

—intrathoracic meningocoele, spinal deformity, and multiple neurofibromatosis (ab), A. W. Lipmann Kessel, Jan., 135

NEWELL, EDWARD A. See FOX, SAMUEL L.

NEWFOUNDLAND

—some observations on renal tuberculosis in Newfoundland (ab), H. B. Murphy, April, 621

NEWMAN, WALTER, and JACOBSON, HAROLD G.: Bizarre pulmonary roentgenographic manifestations in heart disease (ab), June, 896

NICKS, ROWAN. See MCDOWELL, C.

NIELSEN, JENS: Functional results and permanence of cure following roentgenotherapy of intralaryngeal carcinomas (ab), June, 913

NOLAN, JAMES F., and DU SAULT, LUCILLE: Radiation treatment of cancer of the cervix uteri (ab), April, 627

—See COSTLOW, WILLIAM E.

NORDENSTRÖM, BJÖRN E. W., and NORLIN, UNO A. T.: Bronchography with Métras' catheters (ab), March, 445

NORDMANN, S. See WETZEL, U.

NORLIN, UNO A. T. See NORDENSTRÖM, BJÖRN E. W.

NORMAN, OLOF: Studies on the hepatic ducts in cholangiography (ab), Jan., 145

NORMAN, R. C. See JENKINSON, E. L.

NOSE

—See also Nasopharynx
—rhinolith, Raymond J. Terrafranca and Allan Zellis, March, 405

NOSIK, WILLIAM A.: Contrast myelography with emulsified Pantopaque (ab), Feb., 305

NOWELL, STANLEY, EVANS, P. R. C., and KURREIN, F.: Multiple spontaneous "pseudo-fractures" of bone (Milkman's syndrome) (ab), June, 906

NUCLEINS

—effect of roentgen radiation on biosynthesis of nucleic acids and nucleic acid purines (ab), Howard R. Skipper and Jack H. Mitchell, Jr., Feb., 323

NUTRITION

—nutritional heart disease (ab), A. D. Gillanders, March, 453

O

OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, isotope courses, March, 429

O'BEIRN, SEAN: Unusual case of duodenum inversum (ab), May, 771

OBITUARIES

Gerber, Isaac, April, 588

Hyde, Ximie Richard, March, 432

Kerby, James Philip, April, 588

Lechenger, Gilbert Cecil, March, 433

Levi, Leo M., May, 746

Macduff, R. Bruce, Jan., 119

May, Robert J., Feb., 276

Millman, Louis A., Jan., 120

Peterson, Robert Kerr, April, 589

Pomeranz, Raphael, Jan., 119

Putts, B. Swayne, March, 433

Wantz, Julius B., June, 885

OBLEATH, ROBERT W., DONATH, DOUGLAS H., JOHNSTONE, HERBERT G., and KERR, WM. J.: Pulmonary monilia (ab), June, 894

O'BRIEN, EDWARD J., Jr.: See **LAFORET, EUGENE G.**

OBSTETRICS. See Labor; Pelvis, measurement; Pregnancy

OCCIPITAL BONE

—platybasia; 10 cases with comments on familial tendency, a special diagnostic sign, and end results of operation (ab), William B. Scoville and Irving J. Sherman, March, 444

—use of tomography in diagnosis of basilar impression (ab), Vladimir Gvozdanovic and Serije Dogan, Jan., 129

OCHRE

—roentgen picture of ochre-dust lung (ab), R. Haubrich, Jan., 135

OCHSNER, ALTON. See **DeBAKEY, MICHAEL E.**

OCHSNER, HAROLD C.: Chest survey in a large general hospital (ab), March, 446

Cysts of the kidney (ab), Jan., 153

O'CONNELL, JOHN E. A.: Protrusions of the lumbar intervertebral discs. A clinical review based on five hundred cases treated by excision of the protrusion (ab), Jan., 140

O'CONNELL, W. F., and LEE, Y. C.: Pulmonary cardiac failure. Report of a case (ab), Feb., 291

O'CONOR, VINCENT J., CANNON, ABRAM H., LAIPPLY, THOMAS C., SOKOL, KENNETH, and BARTH, EARL E.: Renal tumors: A round table discussion, June, 830

—See **TREMAINE, MYRON J.**

ODELL, RICHARD T., MUELLER, C. BARBER, and KEY, J. ALBERT: Effect on bone grafts of radioactive isotopes of phosphorus (ab), March, 477

O'FARRELL, P. T.: Calcification of left auricle (ab), April, 605

OLIVA, LUIGI: Transverse axial laminagraphy with partial rotation of the patient (ab), May, 787

OLNICK, HERBERT M.. See **WEENS, H. STEPHEN**

OPHTHALMOPTICIA. See Eyes

ORBIT

—calcareous cataract in x-ray picture (ab), E. Vogler, Jan., 130

—orbitoethmoidal osteoma (ab), Byron G. McKibben and Ernest R. Casey, Jr., March, 445

ORR, THOMAS G.. See **TICE, GALEN M.**

ORTEGA, PAUL. See **KELLY, KEITH H.**

ORTHODIAMETRY. See Heart, measurement

OS CALCIS. See Calcaneum

OS LUNATUM. See Semilunar Bone

OSGOOD, EDWIN E.: Titrated, regularly spaced radioactive phosphorus or spray roentgen therapy of leukemias (ab), Feb., 314

OSLER'S DISEASE. See Telangiectasia

OSMOND, JOHN D., Jr., and PRICE, JAY B.: Perforation of gastric ulcer secondary to trichobezoar. Report of a case in which the patient survived (ab), Feb., 295

OSSIFICATION

—appearance of centers of ossification in human pelvis before birth (ab), Carl C. Francis, April, 610

OSTEITIS

—deformans

—dental roentgenologic manifestations of systemic disease. III. Granulomatous disease, Paget's disease, acroscerosis and others, Edward C. Stafne, June, 820

—multicentric osteogenic sarcoma in Paget's disease with cerebral extension (ab), Herbert Derman, et al, Jan., 146

—multiple myeloma complicating Paget's disease (ab), Robert J. Gross and Gabriel Yelin, March, 460

—Paget's disease complicated by hyperparathyroidism (ab), Howard Rosen, Jan., 145

—Paget's osteitis deformans in early stage (ab), U. Wetzel and S. Nordmann, Feb., 305

—theory of its etiology (ab), Sherwood Moore, March, 460

OSTEOARTHROPATHY

—hypertrophic osteoarthropathy in carcinoma of lung (ab), John D. Pettison, Jr., et al, May, 779

OSTEOCHONDRITIS DEFORMANS

—vascular epiphyseal changes in congenital dislocation of hip; results in adults compared with results in coxa plana and in congenital dislocation without vascular changes (ab), William K. Massie, March, 464

OSTEOCHONDROMA. See Tumors, osteochondroma

OSTEOGENESIS IMPERFECTA. See Bones

OSTEOMA. See Tumors, osteoma

OSTEOMYELITIS

—due to Friedländer's bacillus (ab), D. A. Muskat and M. Findlay, May, 779

OSTEONEPHROPATHY. See Dwarfism

OSTEOPETROSIS. See Osteosclerosis fragilis

OSTEOPOROSIS. See Bones, atrophy; Cranium

OSTEOSCLEROSIS

—melorheostosis: forme fruste (ab), W. Brauer, April, 612

—melorheostosis with bone sclerosis in right upper quadrant of body, involvement of skull and skin changes (ab), W. Höfken and G. Heim, Feb., 303

—pathological picture of melorheostosis (Léri); 2 cases (ab), W. Roegner, Feb., 303

—fragilis

—osteopetrosis (marble bones); case, with special reference to early roentgenologic and pathologic findings (ab), Ellsworth Kneal and L. R. Sante, April, 612

OTOLARYNGOLOGY

—radiocobalt in otolaryngology (ab), Lewis F. Morrison, Jan., 158

OTTO-CHROBAK PELVIS. See Pelvis

OUDET, P.: Exploration of pulmonary cavities by water-soluble contrast media for bronchography (ab), Feb., 287

OUDET, J.. See **LEGER, L.**

OVARY

—cancer: results of experiments in 79 cases (ab), L. H. Garland and M. A. Sisson, June, 915

—place of x-ray therapy in treatment of malignant tumors (ab), Margaret C. Tod, April, 629

OVERHOLT, RICHARD H.: The most detectable internal cancer (ab), April, 602

OXYGEN

—aortography with oxygen as contrast medium: preliminary clinical and experimental results (ab), A. D'Errico, June, 899

—effects of thyroid and radiation on sensitivity to hypoxia, basal rate of O₂ consumption and tolerance to exercise (ab), Willie W. Smith and Falconer Smith, April, 636

P

PACK, GEORGE T., and MILLER, THEODORE R.: Hemangiomas: Classification, diagnosis and treatment (ab), Feb., 314

PACKARD, GEORGE B., and REYNOLDS, LEVI E.: Meconium peritonitis (ab), March, 459

PACKARD, JOHN S.: Bilateral tuberculous bronchostenosis in a patient with normal chest roentgenographic findings (ab), April, 602

PADDISON, RICHARD M.. See **DONALD, DAN C., Jr.**

PAGET'S DISEASE. See Osteitis deformans

PAILLÉ, J.. See **DUUCUING, J.**

PANCREAS

—annular pancreas (ab), J. R. Anderson and H. Wapshaw, May, 775

—annular pancreas (ab), B. J. Bickford and J. C. F. Lloyd Williamson, May, 775

—annular pancreas; 2 cases (ab), Conde F. Conroy and George F. Woelfel, May, 774

—pulmonary changes in fibrosis of pancreas (ab), Thomas Rosendal, March, 449

—pseudocysts (ab), Kenneth B. Brihart and James T. Priestley, Jan., 143

—roentgenologic and pathologic examination of tumors in region of pancreas (ab), M. Ludin and S. Scheidegger, Feb., 298

—calcification

—diffuse calcification (ab), Bruno J. Peters, et al, Feb., 299

—disseminated calcification; 2 cases (ab), John H. Kneidel, Feb., 299

—cancer

—carcinoma; 100 cases; clinical and roentgenologic analysis (ab), Thomas R. Broadbent and Herbert D. Kerman, Feb., 299

PANNICULITIS

—relapsing panniculitis (Weber-Christian disease); review of literature and report of case including treatment with cortisone (ab), Charles R. Shuman, March, 476

PANTOPAEQUE. See Spinal Canal Roentgenography

PAPANICOLAOU, B.: Classification of pulmonary tuberculosis with five digit code (ab), April, 600

PAPILLOMA. See Tumors, papilloma

PAPILLON, J., BRET, J., and MARION, P.: Aneurysm of the cardiac apex in a child (ab), May, 767

PARATHYROID

—calcinosis of kidneys associated with parathyroid tumor; clinical and pathological study with case report (ab), Jack D. Kirschbaum and Hal T. Wilson, April, 620

PARATHYROID—cont.

- congenital ureteral dilatation with renal hyperparathyroidism (ab), Robert Brendze and R. William Provenzano, May, 785
- dental roentgenologic manifestations of systemic disease. I. Endocrine disturbances, Edward C. Stafne, Jan., 9
- Paget's disease complicated by hyperparathyroidism (ab), Howard Rosen, Jan., 145

PARATYPHOID

- paratyphoid spondylitis with paravertebral and epidural abscess: case (ab), H. W. Sung and H. C. Tseng, April, 615
- PARENT, SOL.** See **DOWNING, DANIEL F.**
- PARISER, SANFORD, ZUCKNER, JACK, TAYLOR, HENRY K., and MESSINGER, WILLIAM J.:** Mitral stenosis without clinically demonstrable left auricular enlargement (ab), March, 454

PARKINSONISM

- megacolon and dilatation of small bowel in parkinsonism (ab), Alexander Lewitan, et al, March, 458

PAROTID GLAND

- acute parotitis (ab), Jack R. Gustafson, April, 599
- PARPART, ARTHUR K.** See **LUCKÉ, BALDUIN**
- PARR, L. J. A., WHITE, PAUL, and SHIPTON, EVA:** Some observations on 100 cases of ankylosing spondylitis (ab), March, 462

- PARSONS, JONATHAN:** Radiopaque renal calculus identified as cystine by x-ray diffraction, June, 878

- PATERSON, ROBERT KERR (obit):** April, 589

- PATTINSON, J. N.** See **BLOOM, ROSS**

- PATTISON, JOHN D., JR., BECK, ERWIN, and MILLER, WILLIAM B.:** Hypertrophic osteoarthropathy in carcinoma of the lung (ab), May, 779

- PAULSON, DONALD L., and SHAW, ROBERT R.:** Early detection of bronchiogenic carcinoma (ab), May, 763

- PEARSON, CARL M.** See **SOUDERS, CARLTON R.**

- PECK, MORDANT E., NEERKEN, A. J., and SALZMAN, EMANUEL:** Clinical and experimental studies in the use of a water-soluble agent for bronchography (ab), April, 600

—See SALZMAN, EMANUEL**PEDIATRICS.** See Children; Infants, Newborn

- PEIRCE, E. CONVERSE, II.:** Percutaneous arterial catheterization in dogs with special reference to aortography (ab), March, 469

- Percutaneous femoral artery catheterization in man with special reference to aortography (ab), June, 899

PELVIS

- appearance of centers of ossification in human pelvis before birth (ab), Carl C. Francis, April, 610

- arthrokatadysia (Otto pelvis) (ab), Richard Scandalis, et al, April, 616

- pelvic and extrapelvic osteopathy in rheumatoid spondylitis: clinical and roentgenographic study of 90 cases (ab), C. Maynard Guest and Harold G. Jacobson, April, 615

- pelvic horns: a congenital hereditary anomaly within the framework of a malformation syndrome (ab), K. Böck, April, 616

- phantom tumors: case (ab), William S. Goldfarb, March, 470

- pneumoperitoneum in study of pelvic structures (ab), J. R. Maxfield, Jr., May, 783

- position of value in studying the pelvis and its contents (ab), Gerard Raap, Jan., 154

- protrusion acetabuli (Otto-Chirak pelvis): its pathogenesis and roentgen symptomatology (ab), F. Klopfer, Feb., 306

- studies of dosage distribution in pelvis in radium treatment of carcinoma of uterine cervix according to Stockholm method (ab), H.-L. Kottmeier, April, 629

measurement

- clinical and roentgen pelvimetry: a correlation (ab), John E. Savage, March, 466

- diagonal conjugate (ab), D. Frank Kaltreider, April, 619

- radiologic examination of obstetric patient (ed), Robert P. Ball, April, 583

- teleroentgenographic pelvimetry: preliminary report, Donald R. Germann, April, 548

- transverse diameter of inlet (ab), D. Frank Kaltreider, May, 784

- PENDER, JOHN W., and PUGH, DAVID G.:** Diagnostic and therapeutic nerve blocks: necessity for roentgenograms (ab), May, 787

- PENDERGRASS, EUGENE P.** See **FREED, JOHN H.**

- PENICILLIN.** See Spine, diseases

- PENNOYER, MIRIAM M.** See **PERLEY, ANNE**

PEPTIC ULCER

- air-contrast study of duodenal bulb: its importance in diagnosis of duodenal ulcer, Ralph R. Meyer, March, 393

- choledochoduodenal fistula following perforation of duodenal ulcer: treatment by subtotal gastrectomy (ab), G. F. Wollast and W. P. Stampfli, June, 904

- chronic peptic duodenal ulcer with cancerous transformation (ab), E. F. Geever, et al, Jan., 142

- emergency diagnosis of upper digestive tract bleeding by roentgen examination without palpation ("Hampton technique"), Harvey C. Knowles, Benjamin Felson, Nathan Shapiro, and Leon Schiff, April, 536

- gastro-intestinal roentgenographic observations in peptic ulcer patients treated by vagotomy (ab), Charles A. Priviteri, March, 456

- gastrojejunocolic fistula following vagotomy for marginal ulcer (ab), Benjamin F. Byrd, Jr., March, 456

- giant benign duodenal ulcer: case (ab), George Evashwick, Feb., 296

- localized walled-off gas pockets due to perforation complicating peptic ulceration (ab), Samuel M. Gilbert, May, 770

- neurovascular mechanism of stomach and duodenum (etiologic role in ulcer) (ab), H. B. Benjamin, Feb., 294

- perforation of gastric ulcer secondary to trichobezoar; case in which patient survived (ab), John D. Osmond, Jr., and Jay B. Price, Feb., 295

- post-bulbar duodenal ulceration (ab), Warren M. Lonergan and Alfred Kahn, Jr., March, 457

- prolapsing gastric mucosa through gastro-jejunostomy (for duodenal ulcer) simulating cancer of stomach (ab), Bernard Maisel and Sidney Weintraub, April, 606

- serial gastric biopsy studies in case of duodenal ulcer treated by deep x-ray therapy (ab), R. K. Doig, et al, April, 630

- vagotomy in treatment of duodenal ulcer: results in 350 consecutive cases (ab), Joseph Weinberg, et al, Jan., 142

PERABRODIL M. See Brain, blood supply**PERICARDITIS**

- acute benign pericarditis (ab), Morton G. Brown, May, 767

- large thymic tumor simulating pericardial effusion (ab), Arthur Bernstein, et al, March, 452

PERINEPHRITIS

- roentgen appearance of a paranephric abscess perforating into duodenum (ab), Pierre Eggmann, April, 621

PERIRENAL INSUFFLATION. See Adrenals**PERITONEOSCOPY.** See Biliary Tract**PERITONEUM.** See Peritonitis; Pneumoperitoneum**PERITONITIS**

- meconium peritonitis (ab), George B. Packard and Levi E. Reynolds, March, 459

- PERLEY, ANNE, FORBES, GILBERT B., and PENNOYER, MIRIAM M.:** Determination of the sodium²⁴ "space" in infants, children, and adults (ab), Feb., 318

- PERR, HERBERT M.:** Cardiospasm simulating mediastinal tumors (ab), March, 456

- PETERS, BRUNO J., LUBITZ, JOSEPH M., and LINDERT, M. C. F.:** Diffuse calcification of the pancreas (ab), Feb., 299

- PETERSON, EDWIN W., and HOUGHTON, JOHN D.:** Pulmonary adenomatosis. Report of two cases (ab), Feb., 289

PETERSON, J. C. See **HAHN, P. F.****PETROLEUM PRODUCTS**

- incidence of lipid pneumonia in survey of 389 chronically ill patients (ab), B. W. Volk, et al, Feb., 291

PETROSAL SINUS. See Temporal Bone

- PFAUNDLER-HURLER DISEASE.** See Lipochondrodystrophy

PHALANGES. See Thumb**PHARYNX****See also Nasopharynx**

- flexible indicator for use in connection with radiation therapy (ab), Ove Mattsson, March, 476

- goitre plongeant (plunging goiter) associated with pharyngo-esophageal diverticulum, Morris Slobodkin, March, 378

- roentgen rotation therapy in cancer of hypopharynx (ab), Inge Gynning, April, 624

- PHILLIPS, J. R., and MORRISON, J. W.:** Bronchiogenic carcinoma masked by pulmonary tuberculosis. Case report (ab), Jan., 132

- PHLEBITIS.** See Extremities; Thrombophlebitis

- PHLEBOGRAPHY.** See Extremities; Venae Cavae

- PHOSPHORUS, RADIOACTIVE.** See Leukemia; Polycythemia vera; Radioactivity

- PHOTOFLUOROGRAPHY.** See Roentgen Rays, protection against

PHRENICLASIA. See Tuberculosis, Pulmonary**PICA.** See Lead**PIGORINI, LUIGI.** See **ZORINI, A. OMODEI****PILLS**

- significance of opaque medications in gastro-intestinal tract, with special reference to enteric coated pills (ab), C. I. Hinkel, March, 455

PIPKIN, J. L. See **LEHMANN, C. F.****PITUITARY BODY**

- dental roentgenologic manifestations of systemic disease. I. Endocrine disturbances, Edward C. Stafne, Jan., 9

- effect of immaturity, hypophysectomy and adrenalectomy upon changes in blood plasma of rat during acute radiation syndrome (ab), Henry I. Kohn, March, 479

- irradiation of normal human hypophysis in malignancy; 3 cases receiving 8,100-10,100 r tissue dose to pituitary gland (ab), Keith H. Kelly, et al, Feb., 311

- irradiation of pituitary in treatment of malignant exophthalmos (ab), William H. Beierwaltes, March, 471

- suprasellar (Rathke's pouch) cyst; unusual case simulating successively rheumatic fever, encephalitis, and brain-stem tumor, prolonged postoperative recovery and development of pubertas precox (ab), Alexander C. Johnson and John M. Meredith, Feb., 284

- treatment of some disorders by radiotherapy (ab), A. B. Wayne, June, 913

tumors

- chromophobe adenomas: surgical and radiation treatment (ab), Gilbert Horrax, May, 789

- observations on large tumors which have spread widely beyond the confines of sella turcica (ab), Hugh C. Trumble, May, 755

PITUITARY PREPARATIONS

- intestinal gas in radiology (use of acetylcholine and pituitary extract) (ab), M. Arias Bellini, March, 470

PIVER, J. D. See **MURPHY, J. D.**

PIZZOLATO, PHILLIP. See **DERMAN, HERBERT**

PLASMA. See Blood

PLASMOCYTOMA. See Tumors, plasmocytoma

PLATYBASIA. See Atlas and Axis

PLEURISY

—encapsulated effusion simulating mediastinal tumor; 2 cases, Clifford F. Storey, March, 408

—roentgen examination of pleural fluid: study of localization of free effusions, the potentialities of diagnosing minimal quantities of fluid and its existence under physiological conditions (ab), Ingemar Hessén, Jan., 136

—serofibrinous interlobar pleuritis (ab), P. Pruvost, et al, May, 766

PLOMBAGE. See Tuberculosis, Pulmonary

PNEUMATOSIS INTESTINALIS. See Intestines

PNEUMOCOCAL CYSTITIS. See Gallbladder

PNEUMOCOCCOSIS

—acute silicosis: case (ab), R. Grohmann, May, 760

—aluminum lung (ab), Karl-Heinz Ehreke, May, 761

—multiple ossifications in lungs of stone-cutter (ab), J. R. Rüttner and H. Eggenschwyler, May, 760

—roentgen characteristics of silicosis in relation to occupation (ab), R. Haubrich, May, 760

—roentgen picture of ochre-dust lung (ab), R. Haubrich, Jan., 135

—silicosis among iron foundry workers (ab), Saul Solomon, April, 603

PNEUMOENCEPHALOGRAPHY. See Brain, roentgenography

PNEUMONECTOMY. See Lungs

PNEUMONIA

—does ioduron bronchography damage the lung parenchyma? Contribution to pathogenesis of granulomatous changes and xanthomatous and interstitial pneumonia in primary lung processes (ab), Hans U. Zollinger, May, 758

—incidence of lipid pneumonia in survey of 389 chronically ill patients (ab), B. W. Volk, et al, Feb., 291

—lipid pneumonia (non-inhalation) in carcinoma of lung treated by radiotherapy (ab), S. J. De Navasquez, et al, May, 795

—migratory pneumonia without eosinophilia (ab), David Biber and Arthur Buckler, April, 604

—small-dose x-ray therapy in non-specific inflammatory diseases of lung (ab), Rüdiger Seyss, Feb., 315

PNEUMOPERITONEUM

See also Retropneumoperitoneum; Tuberculosis, Pulmonary

—in study of pelvic structures (ab), J. R. Maxfield, Jr., May, 783

—mediastinal emphysema complicating induction of pneumoperitoneum (ab), Maurice J. Small and R. E. Fremont, March, 451

—pneumothorax as complication of pneumoperitoneum (ab), Jack Foy Wu and Wilford B. Neptune, April, 603

—spontaneous pneumothorax, the result of a ruptured diaphragm complicating pneumoperitoneum (ab), J. J. Repa and H. R. Jacobson, March, 448

PNEUMOTHORAX

See also Tuberculosis, Pulmonary

—as a complication of pneumoperitoneum (ab), Jack Foy Wu and Wilford B. Neptune, April, 603

—spontaneous pneumothorax from secondary sarcoma of lung (ab), A. Batty Shaw, Jan., 132

—spontaneous pneumothorax, the result of ruptured diaphragm complicating pneumoperitoneum (ab), J. J. Repa and H. R. Jacobson, March, 448

—treatment of non-tuberculous spontaneous pneumothorax (ab), Etienne Bernard and Andre Meyer, May, 763

POHL, R.: Bullet tract in the lung (ab), Jan., 135

Generalized softening in the tracheobronchial system (ab), Jan., 134

POHLE, ERNST A., and GOLPER, MARVIN N.: Case of lymphoblastoma with unusual skin tumefaction (ab), May, 789

POKORNY, CHARLES. See HYDE, LEROY

POLIOMYELITIS

—lymphoid lesions (ab), Sheldon C. Sommers, et al, April, 636

POLLOCK, MARY, and PREISKEL, ELLA: Hysterosalpingography with a water-soluble medium in the investigation of infertility (ab), April, 618

POLONIUM

—histological and cytological changes produced by alpha-particles in skin of mice (ab), Finn Devik, Jan., 139

—observations on skin reaction to subcutaneous application of metallic polonium in mice (ab), Leiv Kreyberg and Finn Devik, April, 635

POLYCYTHEMIA VERA

—treatment with radioactive phosphorus (ab), Bruce K. Wiseman, et al, Jan., 157

POLYPL. See Tumors, polyp

POMERANZ, RAPHAEL (obit), Jan., 119

PONDSDOMENECH, ELMO R., and BEATO NÚÑEZ, VIRGILIO: Heart puncture in man for diodrast visualization of the ventricular chambers and great arteries. I. Its experimental and anatomophysiological bases and technique (ab), March, 452

—See BEATO NÚÑEZ, VIRGILIO

POOL, R. M., and DUNAVANT, W. DAVID: Vulvulus of the sigmoid colon (ab), April, 608

POPPE, J. E.: Bronchiogenic carcinoma masquerading as other diseases. A review of 200 cases (ab), June, 803

POPPE, JAMES L., and RIEMENSCHNEIDER, P. A.: Tumor of carotid body type presumably arising from the glomus jugularis (ab), Feb., 286

PORPHYRIA

—cause of non-specific small intestinal disturbance (ab), Samuel H. Fisher and Robert R. Stanley, May, 770

—roentgen manifestations of acute intermittent porphyria, George L. Calvy and Carroll C. Dundon, Feb., 204

PORTAL VEIN

—portal circulation in experimental hemorrhagic shock: in vivo roentgen studies (ab), Edward W. Friedman, et al, June, 910

—portography: technic and indications (ab), L. Leger, et al, May, 787

—studies of portal venous system by injection technic (ab), R. O. Holmes and W. V. Lovitt, Feb., 311

PORTER, EDWARD C.: Relationship between the adrenal cortex and radiation sickness. A review of the literature and a presentation of new data, Feb., 246

POST, CHARLES F. See ANDREWS, GEORGE C.

POTTS, WILLIS J. See GANS, STEPHEN L.

—See LEININGER, C. R.

—See LEWIS, JAMES E.

POWELL, MOSTYN L., and HILLER, HENRY G.: Angiocardiography (ab), June, 898

PREGNANCY

See also Craniometry; Fetus; Pelvis

—carcinoma of cervix in pregnancy (ab), R. R. Maier and M. Klein, Jan., 156

—circulating red cell volume and body hematocrit in normal pregnancy and puerperium by direct measurement, using radioactive red cells (ab), William L. Caton, et al, April, 631

—Hodgkin's disease and pregnancy: review of literature and report of case (ab), William Teneblatt and Charles Horton, Feb., 315

—iron metabolism in human pregnancy as studied with radioactive isotope, Fe⁵⁹ (ab), P. F. Hahn, et al, Feb., 318

PREISKEL, ELLA. See POLLOCK, MARY

PRESSURE

—significance of pressure in hysterosalpingography: new instrument for measuring pressure (ab), C. Muller, May, 783

PRICE, JAY B. See OSMOND, JOHN D., Jr.

PRIESTLEY, JAMES T. See BRILHART, KENNETH B.

PRIVITERI, CHARLES A.: Gastrointestinal roentgenographic observations in peptic ulcer patients treated by vagotomy (ab), March, 456

PROSSOR, T. M.: Malignant disease of the testis with special reference to radiotherapy (ab), March, 475

PROTECTION. See Atomic Energy; Radiations; Roentgen Rays

PROVENZANA, R. WILLIAM. See BRENDZE, ROBERT

PROWSE, C. BARRINGTON: Generalized scleroderma with intestinal involvement (ab), May, 770

PRUVOST, P., SAUVAGE, R., and DEPIERRE, R.: Intrathoracic axillary neurinoma (ab), Feb., 290

—TEYSSIER, ISORNI, LEMERCIER, GOSSET, and CELLERIER: Serofibrinous interlobar pleuritis (ab), May, 766

PRYLES, CHARLES V. See HELMSWORTH, JAMES A.

PSENNER, L., and HECKERMAN, F.: Contribution to the roentgen diagnosis and differential diagnosis of fibrous dysplasias of the skeletal system (ab), Feb., 302

PTERYGO-ALAR BAR

—recognition by roentgen methods in trigeminal neuralgia (ab), Kehar S. Chouk and Philip J. Hodes, Jan., 130

PUBERTY

—suprasellar (Rathke's pouch) cyst: unusual case simulating successively rheumatic fever, encephalitis, and brain stem tumor; prolonged postoperative recovery and development of pubertas precoc (ab), Alexander C. Johnson and John M. Meredith, Feb., 284

PUERPERIUM

—circulating red cell volume and body hematocrit in normal pregnancy and puerperium by direct measurement, using radioactive red cells (ab), William L. Caton, et al, April, 631

PUGH, DAVID G. See PENDER, JOHN W.

PULMONARY VALVE

—congenital valvular pulmonary stenosis with or without an interatrial communication: physiologic studies as diagnostic aids (ab), Forrest H. Adams, et al, Feb., 293

PURPURA

—hemangioma associated with thrombocytopenic purpura: report of case and review of literature (ab), Samuel C. Southard, et al, June, 917

—hemangioma with purpura, thrombocytopenia, and erythrocytopenia (ab), Maxwell Bogin and James Thurmond, April, 630

PUTTS, B. SWAYNE (obit), March, 433

PYELOGRAPHY

See also Kidneys

—intestinal gas during pyelography (ab), Myron J. Tremaine, et al, May, 784

—intestinal gas in radiology of use of acetylcholine and pituitary extract (ab), M. Arias Bellini, March, 470

—pyelographic deformity produced by hepatic abscess (ab), William M. Coppridge, et al, April, 621

—results of an inquiry into accidents following intravenous injection of contrast media for examination of urinary system (ab), Jean De Backer, June, 913

—subcutaneous urography: description of new method utilizing 70 per cent Urokon and hyaluronidase; preliminary report (ab), John E. Byrne and William F. Melick, March, 466

PYELOGRAPHY—cont.

—Thorotrast in kidney 11 years after pyelography (ab), K. Breckoff, April, 619

PYKE, DAVID, and SYMONS, CECIL: Calcification of the aortic valve and of the coronary arteries (ab), June, 900

PYLORUS

—hypertrophic pyloric stenosis; case of infantile type followed by an adult type (ab), John W. Dublin and Albert E. Ady, April, 606

Q**Q FEVER**

—pulmonary shadows in Q-fever (ab), R. Glauner, May, 762

QUIRANTE, HUMBERTO A. See **DOSS, A. KELLER**

QVIST, CARL F.: Cholecystitis emphysematosa (ab), Jan., 144

R

RAAB, ADOLPH P. See **MATZNER, MILTON J.**

RAAP, GERARD: A position of value in studying the pelvis and its contents (ab), Jan., 154

RABINOWITZ, MAX S.: Congenital curvature of the tibia (ab), March, 465

RADIATIONS

See also Atomic Energy; Polonium; Radioactivity; Radium; Radon; Roentgen Rays

—concept of a maximum permissible exposure. Carman lecture, Robert S. Stone, May, 639

—continuous γ -radiation of β -emitters. Letter to editor (ab), L. Madansky and F. Rasetti, April, 632

—National Bureau of Standards Circular 507, X-Ray Calibration of Radiation Survey Meters, Pocket Chambers, and Dosimeters, April, 586

effects

—effect of ionizing radiations on broad bean root. Growth rate studies and histological analyses (ab), L. H. Gray and M. E. Scholes, Jan., 156

—radiation effects on man in space [including Takata reaction] (ab), Konrad Buettner, April, 633

injuries effects. See also Atomic Energy; Radioactivity; Roentgen Rays

—late complications following irradiation of pelvic viscera (ab), William C. White and Frederick W. Finn, May, 795

—rare form of malignant joint tumor (ab), Arnold Sonnenschein, June, 920

—relationship between the adrenal cortex and radiation sickness: review of literature and presentation of new data, Edward C. Porter, Feb., 246

protection against

—National Bureau of Standards Handbook 47, Feb., 274

—training courses in radiological health, Jan., 116

RADIOACTIVITY

See also Atomic Energy; Polonium; Radium; Thorotrast; etc.

—isotope courses, Oak Ridge, March, 429

—National Bureau of Standards Handbook 48, Control and Removal of Radioactive Contamination, April, 586

—radioactive isotopes and malignancy (ab), Richard H. Chamberlain, May, 792

—theory and methods of the radioautographic localization of radioelements in tissues (ab), J. Gross, et al, Feb., 319

radioactive estrogens. See Estrogens

radioactive carbon

—excretion of radioactivity during a four-day period following the feeding of carbon 14-labeled 2-acetylaminofluorene to rats (ab), John H. Weisburger, et al, Jan., 158

radioactive cobalt

—cobalt⁶⁰ as a source for radiotherapy (ed), Jan., 113

—in otolaryngology (ab), Lewis F. Morrison, Jan., 158

—individualized interstitial irradiation of cancer of uterine cervix using cobalt⁶⁰ in needles, inserted through a lucite template; progress report (ab), Joseph L. Morton, et al, April, 628

—practical physical aspects in use of radioactive cobalt⁶⁰ as a radium substitute (ab), Isadore Meschan, et al, Jan., 158

—preliminary depth dose and isodose measurements for cobalt⁶⁰ teletherapy unit (ab), W. R. Dixon, et al, Feb., 318

—radioactive cobalt as adjuvant to cancer surgery (ab), Arthur G. James, et al, May, 794

radiofluorescein. See Brain, tumors

radio-diethylstilbestrol

—tissue localization and excretion routes of radioactive diethylstilbestrol (ab), Gray H. Twonbly and Erwin F. Schoenwald, Feb., 320

radiogallium

—studies of radiogallium as a diagnostic agent in bone tumors (ab), W. C. Mulry and H. C. Dudley, Jan., 158

—urinary excretion of gallium by man and animals (ab), J. I. Munn, et al, May, 794

radiogold

—effect of x-radiation and antihistamine drugs on reticuloendothelial system measured with colloidal radiogold (ab), Jack Barrow, et al, Feb., 322

—new method for treatment of cancer of lungs by means of artificial radioactivity (Zn^{65} and Au^{198}); first experimental and clinical studies (ab), J. H. Müller and P. H. Rossier, April, 626

—uses of radioactive gold colloid in therapy and palliation of neoplastic disease (ab), William N. Harsha, June, 919

radioiodine. See also Thyroid

—experimental studies on early lens changes after roentgen

irradiation. Exchange and penetration of radioactive indicators (Na^{24} , K^{42} , I^{131} , P^{32}) in normal and irradiated lenses of rabbits (ab), Ludwig von Sallmann and Beatrice D. Locke, March, 479

—in treatment of angina pectoris (ab), Charles C. Wolferth, et al, March, 477

—National Bureau of Standards Handbook 49, Recommendations for Waste Disposal of Phosphorus-32 and Iodine-131 for Medical Users, April, 586

—role of erythrocyte in blood iodine transport using radioiodine I^{131} (ab), Joseph B. Boatman and Campbell Moses, Feb., 320

—tumor-host studies. Alteration of thyroid, skin, blood, and tumor uptake of I^{131} -tagged diiodotyrosine in rats by transplanted tumors (ab), Kenneth G. Scott and Robert S. Stone, Feb., 320

radioiron

—circulating red cell volume and body hematocrit in normal pregnancy and the puerperium by direct measurement, using radioactive red cells (ab), William L. Caton, et al, April, 631

—iron metabolism in human pregnancy as studied with radioactive isotope, Fe^{59} (ab), P. F. Hahn, et al, Feb., 318

—studies in case of hemochromatosis (ab), T. Alper, et al, May, 794

radiophosphorus. See also Leukemia; Polycythemia Vera

—attempt to measure renal circulation time with P^{32} (ab), H. D. Bruner, et al, Feb., 319

—biological effects of poisoning in rats (ab), Simon Koletsky and James H. Christie, Feb., 319

—effect of a carcinogenic azo dye on radiophosphorus turnover in rat-liver nuclei and cytoplasm (ab), A. Clark Griffin, et al, Feb., 320

—effect on bone grafts of radioactive isotopes of phosphorus (ab), Richard T. Odell, et al, March, 477

—experimental studies on early lens changes after roentgen irradiation. Exchange and penetration of radioactive indicators (Na^{24} , K^{42} , I^{131} , P^{32}) in normal and irradiated lenses of rabbits (ab), Ludwig von Sallmann and Beatrice D. Locke, March, 479

—National Bureau of Standards Handbook 49, Recommendations for Waste Disposal of Phosphorus-32 and Iodine-131 for Medical Users, April, 586

—production of hypochlorhydria by beta radiation of stomach (ab), D. M. Douglas, et al, May, 796

—tracer studies with radioactive phosphorus (P^{32}) on absorption of cerebrospinal fluid and problem of hydrocephalus (ab), John E. Adams, March, 477

—treatment of multiple myeloma (ab), E. Lindgren, et al, May, 793

—uptake of labelled phosphorus by cancer of cervix; preliminary report (ab), Somers H. Sturgis, et al, Feb., 317

—use in studies of glomerular permeability of plasma inorganic phosphate (ab), Philip Handler and David V. Cohn, Feb., 320

radioiodostassium

—experimental studies on early lens changes after roentgen irradiation. Exchange and penetration of radioactive indicators (Na^{24} , K^{42} , I^{131} , P^{32}) in normal and irradiated lenses of rabbits (ab), Ludwig von Sallmann and Beatrice D. Locke, March, 479

radioiodine

—consistency of clearance of radioactive sodium from human muscle (ab), L. H. Wisham, et al, June, 920

—determination of circulation factors with radioactive substances (radioiodine) (ab), P. Waser and W. Hunzinger, May, 792

—determination of sodium²⁴ "space" in infants, children, and adults (ab), Anne Perley, et al, Feb., 318

—experimental studies on early lens changes after roentgen irradiation. Exchange and penetration of radioactive indicators (Na^{24} , K^{42} , I^{131} , P^{32}) in normal and irradiated lenses of rabbits (ab), Ludwig von Sallmann and Beatrice D. Locke, March, 479

—measurement of blood flow by local clearance of radioactive sodium (ab), H. Miller and G. M. Wilson, March, 478

— Na^{24} in the measurement of local blood flow (ab), Robert Semple, et al, June, 919

—significance of radioiodine space in human disease: comparison with the thiocyanate space (ab), Jerry K. Aikawa, June, 920

radiosulfur

—radioautographic visualization of sulfur-35 disposition in articular cartilage and bone of suckling rats following injection of labeled sodium sulfate (ab), Dominic D. Dziewiatkowski, April, 632

radiozinc

—new method for treatment of cancer of lungs by means of artificial radioactivity (Zn^{65} and Au^{198}); first experimental and clinical studies (ab), J. H. Müller and P. H. Rossier, April, 626

RADIOAUTOGRAPHY. See Radioactivity

RADIOCIRCULOGRAPHY. See Blood, circulation

RADIODERMATITIS. See Roentgen Rays, injurious effects

RADIOISOTOPES. See Radioactivity

RADIOLOGICAL SOCIETIES

Alabama Radiological Society, Jan., 115

American College of Radiology, April, 585; June, 885

American Radium Society, April, 585

Argentine Congress of Radiology, March, 428

Ecuador Society of Radiology and Physiotherapy, June, 884

Florida Radiological Society, June, 884

RADIOLOGICAL SOCIETIES—cont.

- Greater Miami Radiological Society, Feb., 274
- Illinois Radiological Society, Jan., 115
- Indian Radiological Association, March, 429
- Kentucky Radiological Society, March, 428
- Los Angeles Radiological Society, Jan., 115
- Nassau Radiological Society, June, 884
- Northeastern New York Radiological Society, Jan., 115
- Ohio State Radiological Society, March, 428
- Pennsylvania Radiological Society, April, 585
- Radiological Society of Hawaii, May, 742
- Rocky Mountain Radiological Society, June, 884
- St. Louis Society of Radiologists, March, 428
- secretaries and meeting dates, Jan., 121; Feb., 277; March, 434; April, 590; May, 747; June, 886
- Sociedad Radiológica Panameña, Feb., 274
- Washington State Radiological Society, Feb., 274
- Westchester (N.Y.) Radiological Society, Jan., 115

RADIOLOGICAL SOCIETY OF NORTH AMERICA

- president, Joseph Clark Bell (ed), Feb., 261
- radiology and related sciences (presentation at Annual Meeting of papers and refresher courses in borderline sciences) (ed), Lauriston S. Taylor, May, 740
- thirty-seventh annual meeting (ed), Feb., 263
- Carman lecture: the concept of a maximum permissible exposure, Robert S. Stone, May, 639
- commercial exhibits, Feb., 269
- presidential address: The country radiologist, John S. Bouslog, April, 556
- refresher courses, Feb., 266
- scientific exhibits, Feb., 267

RADIOLOGY (journal)

- new appointments to editorial staff (ed), April, 584

RADIOLOGY AND RADIOLOGISTS

- American College of Radiology announces group plan of disability income protection, June, 885
- country radiologist: presidential address, John S. Bouslog, April, 556
- ever-widening scope of radiology (ed), March, 425
- radiology and the related sciences (ed), Lauriston S. Taylor, May, 740

RADIOTHERAPY

- See also Cancer; Roentgen Therapy; under diseases, organs and regions
- flexible indicator for use in connection with radiation therapy (ab), Ove Mattsson, March, 476
- role of radiation therapy in pediatrics (ab), Paul H. Reitman, May, 792

RADIUM

- See also Radiations; Radiotherapy; Uterus, cancer; etc.
- fibrosarcoma of tongue after interstitial irradiation; case (ab), Peter Deller, May, 795
- interstitial radium therapy: description of a short intensive technique (ab), C. F. Lehmann and J. L. Pipkin, Feb., 316
- mammary tumor incidence in female C3Hb mice following long continued gamma irradiation (ab), Egon Lorenz, et al, Feb., 322
- measurement of beta-ray applicators, J. Kastern and L. Greenberg, May, 731
- new techniques in radium and radon therapy (ab), Anthony Green and W. Alan Jennings, March, 476

RADIUS

- growth of shaft of human radius and ulna during first two years of life (ab), Musa K. Ghantous, April, 610

RADNER, STIG Vascular angiography by catheterization. A new method employed in 221 cases (ab), Jan., 128**RADON**

- new techniques in radium and radon therapy (ab), Anthony Green and W. Alan Jennings, March, 476

RAINS, A. J. H. Congenital absence of the gall-bladder: cholangiography: gall-stone solvents (ab), May, 774**RANDALL, J. H., MIRICK, D. F., and WIEBEN, E. E.** Endometrial carcinoma (ab), Feb., 313**RANKIN, J. O.** Duodenal obstruction in the newborn (ab), March, 457**RAPHAEL, ROBERT L., SCHNABEL, TRUMAN G., Jr., and LEOPOLD, SIMON S.** A new method for demonstrating an aberrant right subclavian artery, Jan., 89**RAPOPORT, LEONARD M.** Infantile cortical hyperostoses. Report of a case and summarization and evaluation of all other reported cases (ab), April, 611**RASETTI, F.** See MADANSKY, L.**RATHKE'S POUCH.** See Pituitary Body**RAYMOND, EDWARD A.** See SCHWARTZ, NATHANIEL H.**REAGAN, WATTERSON:** Translumbar aortography: its value in diagnosis, management and prognosis of renal pathology (ab), June, 908**RECTUM**

- congenital malformations of rectum and anus, with special reference to treatment of associated fistulas (ab), Ernest E. Arnheim, May, 772
- endometriosis of rectosigmoid (ab), Gordon J. Calver and Milton V. Caldwell, Feb., 298
- inadequacy of routine barium enema for roentgenologic examination (ab), George Levene and Norman C. Veale, May, 772
- retrorectal tumors (ab), Raymond J. Jackman, et al, Feb., 298
- cancer
 - diagnosis of early cancer of large bowel and rectum (ab), Norman A. McCormick, April, 607
- fistula. See Fistula

REEVES, ROBERT J. See CASSEL, CHESTER**—See GLENN, JOHN C., Jr.****REID, ALLEN F., and SORENSON, JEANETTE A.** Effective thyroid depth and compensating measurements for iodine uptake determination, March, 390**REID, DUNCAN E.** See CATON, WILLIAM L.**REINHARDT, K.** Total left pulmonary atelectasis after bronchography (ab), April, 600**REITMAN, PAUL H.** Role of radiation therapy in pediatrics (ab), May, 792**RENDLE-SHORT, JOHN.** See BURROWS, N. F. ELLIOTT**REPA, J. J., and JACOBSON, H. R.** Spontaneous pneumothorax, the result of a ruptured diaphragm complicating pneumoperitoneum (ab), March, 448**RESPIRATION**

- pathologic picture of bronchial insufficiency: contribution to active behavior of lungs in respiration (ab), K. Heckmann, Jan., 131
- voluntary "unilateral breathing" (ab), Emil Rothstein and Robert Strzelczyk, Jan., 131

RESPIRATORY TRACT

- See also Bronchi; Lungs; etc.
- chronic upper respiratory tract infections (ab), R. F. Hendtlass, June, 916
- effects of Ioduron B on respiratory tree of guinea pigs (ab), N. M. Brown, et al, April, 622
- radiologic diagnosis of respiratory lesions in children, Sam B. Chapman, May, 705

RETICULO-ENDOTHELIAL SYSTEM

- effect of x-radiation and antihistamine drugs on reticuloendothelial system measured with colloidal radiogold (ab), Jack Barrow, et al, Feb., 322

RETICULOSARCOMA. See Sarcoma, reticulosarcoma**RETROPERITONEUM.** See Abdomen**RETROPNEUMOPERITONEUM**

- pneumoretroperitoneum (ab), Lucio Rossi, April, 622
- results of laminographic study (ab), Bruno Bonomini, Jan., 154

REYNOLDS, FRANCIS A. Papilloma of the gallbladder (ab), May, 774**REYNOLDS, LEVI E.** See PACKARD, GEORGE B.**RHEUMATIC FEVER**

- suprasellar (Rathke's pouch) cyst: unusual case simulating successively rheumatic fever, encephalitis, and brain-stem tumor; prolonged postoperative recovery and development of pubertas precox (ab), Alexander C. Johnson and John M. Meredith, Feb., 284

RHINOLITH. See Nose**RHINOLOGY**

- rhinological aspects of chronic dacryocystitis (ab), Francis H. McGovern, May, 756

RHINOSCLEROMA

- case (ab), C. S. Chu, et al, April, 630

RIBS

- discontinuities in course of first ribs (ab), H. J. Kipshoven, April, 616
- eosinophilic granuloma (ab), David R. Weir, June, 908
- monostotic fibrous dysplasia of bone; case involving 3 contiguous ribs treated by wide resection of thoracic cage (ab), F. Miles Flickinger, Feb., 303
- neoplastic alterations: roentgen diagnostic contribution (ab), Bruno Bertiglia, Jan., 148

RICCA, RENATO A. See LUCKÉ, BALDUIN**RICHARDSON, B. A.** See COLONNA, PAUL C.**RICHMOND, J. JACKSON.** Importance of radiotherapy in the treatment of ankylosing spondylitis (ab), June, 917**RICKETS, RENAL.** See Dwarfism**RIEMENSCHNEIDER, PAUL A.** See ECKER, ARTHUR**—See POPPEN, JAMES L.****RIESSER, JOHN F., and VICAS, BENEDICT:** Gallstone impacted in the duodenal cap, March, 401**RIFE, C. SHERILL:** Benign duodenocolic fistula (ab), May, 77**RIGBY, ELMER C., and ROSSMAN, PHILLIP L.** Bronchiogenic cysts. Report of two cases (ab), May, 702**RIGLER, LEO G.** Acute abdominal conditions. Roentgen diagnosis (ab), June, 904**—See EVERETT, E. FRANK****—and LASSER, ELLIOTT:** Prolapse of the lower lip of the ileocecal valve into the terminal ileum (ab), May, 771**—See RIZICKA, FRANCIS F., Jr.****RINEBERG, IRVING E., and GROSS, ROBERT J.** Hypervitaminosis A, with infantile cortical hyperostosis (ab), May, 779**RITTER, JOSEPH A.** See EPSTEIN, NATHAN**RIVERO, EDUARDO:** Bronchography in children (ab), Jan., 131**ROACH, JOHN F.** See SCOTT, H. WILLIAM, Jr.**ROBB, DOUGLAS.** See McDOWELL, C.**ROBBINS, LAURENCE L.,** appointed to editorial staff of Radiology, April, 584**ROBBINS, LAURENCE L.** See HANELIN, JOSEPH**ROBERTS, LOUIS S.** See COPPRIDGE, WILLIAM M.**ROBERTS, WILLIAM M.** See WEBSTER, FREDERICK S.**ROBERTSON, PHILIP W., and MORLE, K. D. FORGAN:** Delayed pulmonary complications of bronchography (ab), Jan., 131**ROBERTSON, R. F.** Interlobar hydrothorax in cardiac failure (ab), Jan., 136**ROBINSON, IRWIN B., and SARNAT, BERNARD G.** Roentgen studies of the maxillae and mandible in sickle-cell anemia, April, 517

- ROBINSON, P. K.** See **BLACKWOOD, W.**
- ROBLES GIL, JAVIER:** Clinical study of visceral lesions and endocrine disturbances in eight cases of diffuse scleroderma (ab), March, 470
- ROBSON, N. J.** See **JACOBSON, L. O.**
- ROBY, CHARLES C.** See **CATON, WILLIAM L.**
- ROCCO, ALBERT F., HUNT, R. R., and SAVRAN, J.:** Acute pneumocholecystitis. Case report and brief review of the literature, Feb., 228
- ROENTGEN RAYS**
- See also Body Section Roentgenography; Kymography; Microradiography; Radiations; Roentgen Therapy
- National Bureau of Standards Circular 507, X-Ray Calibration of Radiation Survey Meters, Pocket Chambers, and Dosimeters, April, 586
- radiopaque renal calculus identified as cystine by x-ray diffraction, Jonathan Parsons, June, 878
- splanchic removal of bacteria from circulating blood of irradiated rabbits (ab), J. Lamar Callaway and Grace P. Kerby, Jan., 160
- apparatus.** See also Roentgen Therapy
- device for immobilizing children during radiographic examinations, Earl R. Miller, March, 421
- equipment for microradiography with soft roentgen rays (ab), A. Engström and L. Wegstedt, April, 622
- non-opaque roentgenographic and water-repellent examining table mat (ab), M. Swick, May, 788
- roentgenologic apparatus attachable to Bell fracture table (ab), Ray K. Runge, et al, June, 912
- simple accurate plane and incline indicator, A. L. L. Bell and Jerome Zwanger, Feb., 259
- syringe wired for automatic x-ray exposure, Nathan Flax and Robert Waldron, May, 726
- diagnosis.** See Roentgen Rays, injurious effects; Roentgen Rays, protection against; under diseases and organs
- effects.** See also Roentgen Rays, injurious effects
- adrenal shielding and survival of rats after x-irradiation (ab), Abraham Edelmann, Feb., 321
- changes in cell morphology and histochemistry of testis following irradiation and their relation to other induced testicular changes. I. Quantitative random sampling of germinal cells at intervals following direct irradiation. II. Comparison of effects of doses of 1,440 r and 5,050 r with 300 r (ab), Lloyd C. Fogg and Russell F. Cowing, Feb., 323
- changes in composition of blood plasma of rat during acute radiation syndrome, and their partial mitigation by dibenamine and cortin (ab), Henry I. Kohn, March, 478
- differential effects of roentgen rays on cell permeability and on cell cleavage. Experiments with egg cells of *Arbacia punctulata* (ab), Balduin Lucké, et al, Feb., 323
- effect of immaturity, hypophysectomy and adrenalectomy upon changes in blood plasma of rat during acute radiation syndrome (ab), Henry I. Kohn, March, 479
- effect of thyroid hormone on radiation lethality (ab), Willie W. Smith and Falconer Smith, April, 635
- effect of x-radiation and antihistamine drugs on reticulo-endothelial system measured with colloidal radiogold (ab), Jack Barrow, et al, Feb., 322
- effects of thyroid and radiation on sensitivity to hypoxia, basal rate of O_2 consumption and tolerance to exercise (ab), Willie W. Smith and Falconer Smith, April, 636
- exercise effects on tolerance to radiation (ab), Falconer Smith and Willie W. Smith, April, 636
- experimental radiation cataracts. I. Cataracts in rabbit following single x-ray exposure (ab), David G. Cogan and David D. Donaldson, April, 634
- experimental studies on early lens changes after roentgen irradiation. Exchange and penetration of radioactive indicators (Na^{24} , K^{42} , I^{131} , P^{32}) in normal and irradiated lenses of rabbits (ab), Ludwig von Sallmann and Beatrice D. Locke, March, 479
- histologic and chemical alterations produced in mouse epidermis by soft radiation (ab), M. H. Toosy, April, 634
- life span of white blood cells as measured in irradiated parabiotic rats (ab), Donald C. Van Dyke and Rex L. Huff, April, 635
- lymphoid lesions in poliomyelitis (experimental studies in irradiated mice) (ab), Sheldon C. Sommers, et al, April, 636
- on biosynthesis of nucleic acids and nucleic acid purines (ab), Howard E. Skipper and Jack H. Mitchell, Jr., Feb., 323
- on erythrocytic plasma and cell volumes (ab), Jacob Furth, et al, Jan., 159
- on intestinal motility of rat (ab), Robert A. Conard, April, 633
- on *Microsporium canis*, an in vitro study (ab), Kurt Loewenthal, April, 636
- on regular and constant behavior pattern of flocculation test following roentgen irradiation in man (ab), Maki Takata, Feb., 324
- quantitative evaluation of growth rates in tumors before and after radiation (ab), Anna Goldfeder, Feb., 322
- films.** See Roentgenograms
- injuries.** See also Radiations, injurious effects; Roentgen Rays, effects; Roentgen Rays, protection against
- development of basal cell epithelioma as a consequence of radiodermatitis (ab), Nelson P. Anderson and Harold E. Anderson, April, 632
- experimental studies. See Roentgen Rays, effects
- generalized herpes zoster; case following roentgen therapy, associated with chronic lymphatic leukemia, leukemia cutis and Mikulicz's syndrome (ab), Edward L. Bosworth, April, 632
- late sequelae following cancerical irradiation in children; 3 cases, Walter T. Murphy and David L. Berens, Jan., 35
- leukemia as possible complication of radiodermatitis (ab), Francis W. Lynch, Feb., 321
- lipoid pneumonia (non-inhalation) in carcinoma of lung treated by radiotherapy (ab), S. J. De Navasquez, et al, May, 795
- modification of acute irradiation injury in mice and guinea-pigs by bone marrow injections, Egon Lorenz, Charles Congdon and Delta Uphoff, June, 863
- pathogenesis and treatment of postirradiation syndrome (ab), J. Garrott Allen, et al, Feb., 321
- radiation damage to normal tissues in diagnosis and treatment of non-malignant conditions and its surgical repair (ab), Ernest M. Daland, May, 794
- radiation hazards to embryo and fetus, Liane Brauch Russell and W. L. Russell, March, 369
- recovery from radiation injury; further studies (ab), L. O. Jacobson, et al, May, 796
- protection against**
- absorption of 2-mev constant potential roentgen rays by lead and concrete, W. W. Evans, R. C. Granke, K. A. Wright, and J. G. Trump, April, 560
- change in x-ray protection handbook, Jan., 116
- monitoring of a diagnostic x-ray department, Lillian E. Jacobson, Joel J. Schwartzman, and Saul Heiser, April, 568
- prevention of injury (ab), Francis R. Holden, et al, March, 478
- protective effect of small lead shields during repeated whole-body irradiation of rats, J. Gershon-Cohen, M. B. Hermel, and J. Q. Griffith, Jr., March, 383
- secondary radiation limits in photofluorography (ab), Willard W. Van Allen, April, 633
- technic.** See Body Section Roentgenography; Brain, blood supply; Joints; Kymography; etc.
- ROENTGEN THERAPY**
- See also Cancer; Roentgen Rays, effects; Roentgen Rays, injurious effects; under organs and regions
- clinical experience with irradiation through a grid, Hirsch Marks, March, 338
- comparative study of x-ray transmission in thorax and abdomen in living subjects, Joseph R. Nahon and Carrol P. Naidorf, Feb., 241
- comparison of dose distributions in patients treated with x-ray beams of widely different energies, Hugh Garrison, John Anderson, John S. Laughlin, and Roger A. Harvey, March, 361
- depth dose curves for grids, Robert Loewinger, March, 351
- irradiation through grids (ed), G. Failla, March, 424
- low voltage therapy with a beryllium window tube. I. Introduction and advantages (ab), Anthony Green, Feb., 316
- low voltage therapy with a beryllium window tube. II. Achievement of optimum depth dosage distributions—from the physical standpoint (ab), W. A. Jennings, Feb., 316
- low voltage x-ray therapy with a beryllium window tube. III. Technic, reactions and results (ab), R. F. Hendtlass, Feb., 316
- organization of the computer system of x-ray case planning at the Lincolnshire Radiotherapy Centre, Duncan D. Lindsay, June, 850
- possibilities of combinations of chemotherapy and of radiotherapy (ab), R. Sarasin and H. Dubois-Ferrière, June, 917
- radiation dosage planning and dosage calculation (ed), Edith H. Quimby, June, 881
- recent clinical experience with grid in x-ray treatment of advanced cancer; preliminary report, William Harris, March, 343
- supervoltage radiotherapy (ab), B. W. Windeyer, April, 623
- supervoltage technic and engineering (ab), Odd Dahl, April, 623
- ROENTGENOGRAMS**
- effect of focal size, shape and "structure" on roentgenographic representation of small-caliber metal objects (ab), Arne Frantzell, March, 469
- ROESER, ERWIN H.** See **SLAUGHTER, DANIEL P.**
- ROGERS, J. C. T.** See **HOYNE, ROBERT M.**
- ROHN, ROBERT J.** See **WISEMAN, BRUCE K.**
- ROLLINS, STACY L., Jr.** See **DONALD, DAN C., Jr.**
- ROSEMOND, GEORGE P., BOUCOT, KATHARINE R., AEGERTER, ERNEST:** Solitary pulmonary adenoma (focal pulmonary adenomatosis): three-year follow-up after resection (ab), May, 762
- ROSEN, HOWARD:** Paget's disease complicated by hyperparathyroidism (ab), Jan., 145
- ROSENAK, BERNARD D., and VAN VACTOR, HELEN D.:** Extramucosal intramural enteric cyst of the esophagus. A case report (ab), June, 901
- ROSENBAUM, PAUL.** See **MESCHAN, ISADORE**
- ROSENDAL, THOMAS:** Pulmonary changes in fibrosis of the pancreas (ab), March, 449
- ROSS, DONALD.** See **BROWN, ROBERT B.**
- ROSS, JOHN R., and JOHNSON, ALLEN C.:** Diaphragmatic hernia: case report (ab), May, 775
- ROSSI, LUCIO:** Pneumoretroperitoneum (ab), April, 622
- ROSSIER, P. H.** See **MÜLLER, J. H.**

- ROSSMAN, PHILLIP L. See RIGBY, ELMER C.
 ROTATION THERAPY. See Esophagus; Pharynx
 ROTHSTEIN, EMIL, and STRZELCZYK, ROBERT: Voluntary "unilateral breathing" (ab), Jan., 131
 ROWLAND, S. See DOUGLAS, D. M.
 RUBIN, SIDNEY, and STRATEMEIER, EDWARD H.: Intrathoracic meningocele. Case report, April, 552
 RUDHE, ULF. See KJELLBERG, SVEN R.
 RUDNIKOFF, ISADORE, and HEADLAND, COURTENAY I.: Pulmonary changes following cholecystectomy (ab), June, 896
 RÜTTNER, J. R., and EGGENSCHWYLER, H.: Multiple ossifications in the lungs of a stone-cutter (ab), May, 760
 RUGGIN, JULIAN M. See CASSEL, CHESTER
 RUNGE, RAY K., KIRKLIN, B. R., and GHORMLEY, RALPH K.: Roentgenologic apparatus attachable to the Bell fracture table (ab), June, 912
 RUNGE, TOM M. See SMITH, HUGH P., Jr.
 RUSH, CARL: Treatment of Wilms' tumor (ab), May, 790
 RUSCH, THOMAS W. See SMITH, PARKE G.
 RUSSELL, LIANE B., and RUSSELL, W. L.: Radiation hazards to the embryo and fetus, March, 369
 RUSSELL, W. L. See RUSSELL, LIANE B.
 RUZICKA, FRANCIS F., Jr., and RIGLER, LEO G.: Inflation of the stomach with double contrast. A roentgen study (ab), Feb., 294
- S
- SACROILIAC JOINT
 —less common x-ray findings in lumbago in women (ab), August Verhagen, Jan., 150
 SACRUM
 —retrorectal tumors (ab), Raymond J. Jackman, et al, Feb., 298
 SALÉN, ERNST F.: Phlebographic study of constrictive processes in the superior vena cava area and of accompanying changes in the collateral circulation (ab), May, 786
 von SALLMANN, LUDWIG, and LOCKE, BEATRICE D.: Experimental studies on early lens changes after roentgen irradiation. II. Exchange and penetration of radioactive indicators (Na^{24} , K^{42} , I^{131} , P^{32}) in normal and irradiated lenses of rabbits (ab), March, 479
 SALPINGOGRAPHY. See Fallopian Tubes
 SALZMAN, EMANUEL, PECK, MORDANT E., and NEERKEN, A. J.: Methocel-diiodrast: a viscous water-soluble contrast medium for bronchography. Roentgen and clinical results in 23 cases, Feb., 209
 —See PECK, MORDANT E.
 SANTE, L. R. See KNEAL, ELLSWORTH
 SANTE, P., GALLY, P., JAUBERT, and de BEAUJEU, M.: Cystic lymphangioma of the mediastinum (ab), Feb., 291
 SARASIN, R., and DUBOIS-FERRIERE, H.: Possibilities of combinations of chemotherapy and of radiotherapy (ab), June, 917
 SARCOMA
 —See also Synovial Membrane; under organs and regions
 fibrosarcoma
 —of tongue after interstitial irradiation; case (ab), Peter Deller, May, 795
 lymphosarcoma
 —clinical manifestations and diagnosis of lymphosarcoma and round-cell sarcoma of stomach (ab), O. Walther, June, 902
 —cytologic and radiologic observations in lymphosarcoma of stomach; case (ab), K. F. Ernst, et al, March, 456
 —lymphoblastoma with unusual skin tumefaction; case (ab), Ernst A. Pohle and Marvin N. Golper, May, 789
 —roentgen manifestations of lymphosarcoma of stomach, Paul H. Deeb and Walter L. Stillson, April, 329
 metastases. See also Bones, tumors
 —spontaneous pneumothorax from secondary sarcoma of lung (ab), A. Batty Shaw, Jan., 132
 neurosarcoma
 —primary solitary neurogenic tumors of lung (ab), Walter Diveley and Rollin A. Daniel, Jr., Jan., 132
 reticulosarcoma
 —ossifying chondromatosis of spine with secondary reticulosarcomatosis (ab), G. Lehmann and F. Leicher, Jan., 149
 round-cell
 —clinical manifestations and diagnosis of lymphosarcoma and round-cell sarcoma of stomach (ab), O. Walther, June, 902
 SARNAT, BERNARD G. See ROBINSON, IRWIN B.
 SAUVAGE, R. See PRUVOST, P.
 SAVAGE, D. V. See ALPER, T.
 SAVAGE, JOHN E.: Clinical and roentgen pelvimetry: correlation (ab), March, 466
 SAVIGNAC, EUGENE M.: Chondrodystrophia calcificans congenita. Report of a case, March, 415
 SAVILL, DOUGLAS L.: Manubrio-sternal joint in ankylosing spondylitis (ab), Jan., 149
 SAVKAN, J. See ROCCO, ALBERT F.
 SCAMMAN, CLARENCE L.: Follow-up study of lung-cancer suspects in a mass chest x-ray survey (ab), March, 446
 SCANDALIS, RICHARD, GHORMLEY, RALPH K., and DOCKERTY, MALCOLM B.: Arthrokatadysia (Otto pelvis) (ab), April, 616
 SCAPHOID BONE, CARPAL
 —fissure formation in navicular bone as posttraumatic pseudarthrosis (ab), H. Gieseking, April, 617
 SCHAUB, KARL: Roentgen findings in four cases of small-intestinal tumor (ab), Feb., 295
 SCHEIBERT, CHARLES D. See DeSAUSSURE, RICHARD L., Jr.
 SCHEIDEGGER, S. See LÜDIN, M.
 SCHENK, MAX. See ZEMAN, FREDERIC D.
 SCHIFF, LEON. See KNOWLES, HARVEY C.
 SCHIFFER, K. H.: Early changes in the cerebrum and dysplasia of the base of the skull (ab), June, 892
 Value of the appearance of the ventricle in the encephalogram (ab), June, 892
 SCHMID, PAUL CH.: Segmental distribution of shrinkage of parts of the lungs, with bronchiectasis formation (ab), Jan., 133
 SCHMIDT, C. ROBERT, HUEBERT, D. W., and DEAZELL, JAMES M.: Retrocaval ureter (ab), Jan., 153
 SCHMITT, H. G.: Case of gastric actinomycosis (ab), Jan., 141
 SCHMITZ, HERBERT E.: End results of radiation treatment of cancer of the cervix uteri (ab), April, 627
 SCHNABEL, TRUMAN G., Jr. See RAPHAEL, ROBERT L.
 SCHNEIDER, LOUIS, and WIDELOCK, DANIEL: "Positive sputum" without pulmonary tuberculosis. Pitfalls of positive sputum interpretation, with eight clinico-roentgen observations (ab), April, 602
 SCHOENEWALDT, ERWIN F. See TWOMBLY, GRAY H.
 SCHOEPS, JOHANNES: Importance of congenital toxoplasma infection for the etiologic x-ray diagnosis of organic defects of the central nervous system (ab), Jan., 129
 SCHOLES, M. E. See GRAY, L. H.
 SCHÜLLER-CHRISTIAN SYNDROME
 —dental roentgenologic manifestations of systemic disease. III. Granulomatous disease, Paget's disease, acrosclerosis and others, Edward C. Stafne, June, 820
 SCHWARTZ, A., and FRAENKEL, M.: Diversion of venous blood flow through transverse sinuses in one-sided innominate vein obstruction, May, 728
 SCHWARTZ, NATHANIEL H., SWINGLE, ROY C., and RAYMOND, EDWARD A.: Malignant tumors of the duodenum. Report of two cases (ab), Feb., 296
 SCHWARTZMAN, JOEL J. See HEISER, SAUL
 —See JACOBSON, LILLIAN E.
 SCHWINGER, AARON. See HEMLEY, SAMUEL D.
 SCINTILLATION COUNTER. See Counters
 SCLERODERMA
 —clinical study of visceral lesions and endocrine disturbances of diffuse scleroderma; 8 cases (ab), Javier Robles Gil, March, 470
 —generalized scleroderma with intestinal involvement (ab), C. Barrington Prowse, May, 770
 —with involvement of esophagus (ab), Horst Dörken, April, 605
 SCLEROSIS
 —See also Arteriosclerosis; Maxillary Sinus; Osteosclerosis
 tuberos
 —osseous lesions, John F. Holt and Willard W. Dickerson, Jan., 1
 —radiologic and pathologic aspects, with special reference to hydrocephalus (ab), David Sutton and L. A. Liversedge, March, 443
 SCOFIELD, NORMAN E. See GAINES, WALTER
 SCOTT, H. WILLIAM, Jr., and ROACH, JOHN F.: Phlebography of the leg in the erect position (ab), June, 909
 SCOTT, KENNETH G., and STONE, ROBERT S.: Tumor-host studies. III. Alteration of thyroid, skin, blood, and tumor uptake of I^{131} -tagged diiodotyrosine in rats by transplanted tumors (ab), Feb., 320
 SCOTT, RALPH C. See HELMSWORTH, JAMES A.
 SCOTT, ROLAND B., and BANKS, OTTO: Cleidocranial dysostosis syndrome. Report of a case in a Negro child exhibiting retarded growth (ab), March, 462
 SCOTT, WENDELL G. See SWEENEY, BERNARD J.
 SCOVILLE, WILLIAM B., and SHERMAN, IRVING J.: Platylasia: report of ten cases with comments on familial tendency, a special diagnostic sign, and the end results of operation (ab), March, 444
 SCURVY
 —roentgen findings in diagnosis and management of infantile scurvy; 3 cases (ab), Leonard S. Ellenbogen, et al, Jan., 147
 —skeletal changes resembling scurvy in infantile hypothyroidism before and after thyroid therapy (ab), Arne Engeset, et al, May, 778
 SEALY, W. C.: Report of two cases of the anomalous origin of the right subclavian artery from the descending aorta (ab), Feb., 309
 SEARS, BERNARD R. See KONTOFF, HENRY A.
 SECOR, CHARLES. See KING, DON
 SEED, G. S.: Malignant tumours of the upper jaw (ab), March, 445
 SEIDMAN, LEON. See LAWTON, STANLEY E.
 SELLA TURCICA
 —pituitary tumors: observations on large tumors which have spread widely beyond the confines of sella turcica (ab), Hugh C. Trumble, May, 755
 SEMILUNAR BONE
 bipartite os lunatum (ab), Pierre Eggmann, Feb., 306
 SEMPLE, ROBERT, McDONALD, LAWSON, and EKINS, R. P.: Radioactive sodium (Na^{24}) in the measurement of local blood flow (ab), June, 919
 SEPTUM PELLUCIDUM. See Brain
 SERUTAN
 —complete obstruction of esophagus following Serutan ingestion (ab), C. L. Hinkel, May, 768
 SERVELLE and DEYSSON: Reflux of the intestinal chyle in the lymphatics of the leg (ab), Jan., 154
 SEYSS, RÜDIGER: Roentgen pattern of dysostosis multiplex (Pfaundler-Hurler disease) (ab), Jan., 147

- EYSS, RÜDIGER**—*cont.*
Roentgen pattern of the infantile spine (ab), May, 781
Small dose x-ray therapy in nonspecific inflammatory diseases of the lung (ab), Feb., 315
- SHAFER, JUNE C.** See **THOMPSON, ACORS W.**
- SHAFER, SID J., and LARMON, WILLIAM A.**: Pigmented villonodular synovitis. Report of seven cases (ab), April, 617
- SHAPIRO, M. J.** See **ADAMS, FORREST H.**
- SHAPIRO, NATHAN.** See **KNOWLES, HARVEY C.**
- SHAPIRO, ROBERT**: Thrombosis of the internal carotid artery, Jan., 94
- SHAW, A. BATTY**: Spontaneous pneumothorax from secondary sarcoma of lung (ab), Jan., 132
- SHAW, ROBERT R.** See **PAULSON, DONALD L.**
- SHEERAN, DAN H.** See **LIVESAY, JACKSON E.**
- SHELBY, DONALD C., and VAUGHN, JOHN O.**: Juvenile type of Werner's syndrome: progressive musculocutaneous dystrophy observed for 18 years (ab), March, 461
- SHEN, SHU CHU, and HOMBURGER, F.**: Anemia of cancer patients and its relation to metastases to the bone marrow (ab), Jan., 151
- SHEPPARD, C. W.** See **HAHN, P. F.**
- SHERMAN, IRVING J.** See **SCOVILLE, WILLIAM B.**
- SHIMKIN, MICHAEL B.** See **KELLY, KEITH H.**
- SHIPMAN, S. J.** See **GARLAND, L. H.**
- SHIPTON, EVA.** See **PARR, L. J. A.**
- SHOCK**
—portal circulation in experimental hemorrhagic shock: in vivo roentgen studies (ab), Edward W. Friedman, et al., June, 910
- SHOES**
—mass radiography findings in Northamptonshire boot and shoe industry, 1945-6 (ab), Alice Stewart and J. P. W. Hughes, March, 446
- SHOULDER**
—melorheostosis with bone sclerosis in right upper quadrant of body, involvement of skull, and skin changes (ab), W. Hoffken and G. Heim, Feb., 303
—radiation therapy of the non-traumatic painful shoulder, E. L. Jenkinson, R. C. Norman, and J. A. Wilson, Feb., 192
—supraspinatus tendinitis: survey of 300 consecutive cases treated by roentgen therapy (ab), Oliver T. Steen and J. A. L. McCullough, Jan., 156
- SHUMACKER, HARRIS B., Jr.** See **ZIPERMAN, H. HASKELL**
- SHUMAN, CHARLES R.**: Relapsing panniculitis (Weber-Christian disease). Review of literature and report of a case including treatment with cortisone (ab), March, 476
—See **ZATUCHNI, JACOB**
- SIGMOID**
—endometriosis of rectosigmoid (ab), Gordon J. Culver and Milton V. Caldwell, Feb., 298
—morphological-functional observations in dolichosigmoid; 70 cases (ab), Giancarlo Lischi, May, 772
—phantom tumors of pelvis: case (redundant loop of rectosigmoid) (ab), William S. Goldfarb, March, 470
—volvulus. See **Intestines**
- SILBERSTEIN, HANNAH E.** See **LEWISON, EDWARD F.**
- SILICOSIS.** See **Pneumoconiosis**
- SILVERMAN, FREDERIC N.**: Urologic problems in pediatric x-ray diagnosis. March, 325
- SILVERMAN, SAMUEL H.** See **GRIBETZ, DONALD**
- SIMMONS, E. L.** See **JACOBSON, L. O.**
- SIMON, FRANKLIN.** See **BERNSTEIN, ARTHUR**
- SIMPSON, JAMES R.** See **MAYFIELD, FRANK H.**
- SINCLAIR, WILLIAM J.**: Congenital short esophagus. Review of literature and eight original cases, including one autopsy report (ab), March, 454
- SINUS**
carotid. See **Carotid Sinus**
coronary. See **Heart**
petrosal. See **Temporal Bone**
transverse. See **Transverse Sinus**
- SINUSES, PARANASAL**
See also **Ethmoid Sinus**; **Frontal Sinus**; **Maxillary Sinus**
—roentgen therapy in lymphadenitis and sinusitis in childhood, with 10-year follow-up of 349 cases (ab), Harold Levy, June, 916
—unilateral pansinal mucocoele simulating malignant neoplasm: case (ab), Walter P. Anthony and Henry L. Williams, Jan., 130
- SISSON, M. A.** See **GARLAND, L. H.**
- SISSONS, H. A.** See **MÜLLER, G. M.**
- SITUS INVERSUS.** See **Viscera**
- SIÖGREN'S DISEASE.** See **Glands**
- SKIN**
—generalized herpes zoster: case following roentgen therapy, associated with chronic lymphatic leukemia, leukemias cutis and Mikulicz's syndrome (ab), Edward L. Bosworth, April, 632
—histologic and chemical alterations produced in mouse epidermis by soft x-radiation (ab), M. H. Toosy, April, 634
—histological and cytological changes produced by alpha-particles in skin of mice (ab), Finn Devik, Jan., 159
—juvenile type of Werner's syndrome: progressive musculocutaneous dystrophy observed for 18 years (ab), Donald C. Shelby and John O. Vaughn, March, 461
—lymphoblastoma with unusual skin tumefaction: case (ab), Ernst A. Pohle and Marvin N. Golper, May, 789
—melorheostosis with bone sclerosis in right upper quadrant of body, involvement of skull, and skin changes (ab), W. Hoffken and G. Heim, Feb., 303
—observations on skin reaction to subcutaneous application of metallic polonium in mice (ab), Leiv Kreyberg and Finn Devik, April, 635
—tumor-host studies: Alteration of thyroid, skin, blood, and tumor uptake of ^{131}I -tagged diiodotyrosine in rats by transplanted tumors (ab), Kenneth G. Scott and Robert S. Stone, Feb., 320
- cancer**
—development of basal-cell epithelioma as consequence of radiodermatitis (ab), Nelson P. Anderson and Harold E. Anderson, April, 632
—dose-time relationship for cure of squamous-cell carcinoma (ab), J. Robert Andrews and Thomas O. Coppedge, May, 788
—experiences in treatment with ultrasoft roentgen rays, 1933-1936 (ab), Erik Ebbelhøj, May, 788
—results of treatment with ultrasoft roentgen rays given in a single dose (ab), Eyvind Moskilde, May, 789
- SKIPPER, HOVARD E., and MITCHELL, JACK H., Jr.**: Effect of roentgen-ray radiation on the biosynthesis of nucleic acids and nucleic acid purines (ab), Feb., 323
- SKULL.** See **Cranium**
- SLADE, WALTER R., Jr.** See **LEWITAN, ALEXANDER**
- See **VOLK, B. W.**
- SLAUGHTER, DANIEL P., and ROESER, ERWIN H.**: Management of carcinoma of the cervical esophagus (ab), Jan., 155
- SLOAN, R. D.** See **COOLEY, R. N.**
- SLOBODKIN, MORRIS**: Goitre plongeant (plunging goiter) associated with pharyngo-esophageal diverticulum. Report of a case, March, 378
- SLOVITER, HENRY A.**: Effect of complete ablation of thyroid tissue by radioactive iodine on the survival of tumor-bearing mice (ab), April, 631
- SMALL, MAURICE J., and FREMONT, R. E.**: Mediastinal emphysema complicating induction of pneumoperitoneum (ab), March, 451
- SMART, J.** See **LEWIS, A. A. G.**
- SMITH, ARTHUR B.**: Brain tumors in children, May, 688
- SMITH, FALCONER, and SMITH, WILLIE W.**: Exercise effects on tolerance to radiation (ab), April, 636
—See **SMITH, WILLIE W.**
- SMITH, HUGH P., Jr., and RUNGE, TOM M.**: Oral cholecystography: critical review of 200 operated cases (ab), April, 609
- SMITH, J. CHANDLER**: Anomalous pulmonary veins (ab), Feb., 309
- SMITH, LEWIS A.** See **ERNST, K. F.**
- SMITH, NEWTON D.** See **JACKMAN, RAYMOND L.**
- SMITH, O. E.** See **ASHBY, D. W.**
- SMITH, PARKE G., RUSH, THOMAS W., and EVANS, ARTHUR T.**: An evaluation of translumbar arteriography (ab), May, 785
- SMITH, WILLIE W., and SMITH, FALCONER**: Effect of thyroid hormone on radiation lethality (ab), April, 635
Effects of thyroid and radiation on sensitivity to hypoxia, basal rate of O_2 consumption and tolerance to exercise (ab), April, 636
—See **SMITH, FALCONER**
- SMOLIE, EDMUND A., and NASH, FRANCIS P.**: Lumbar sprained arachnoiditis: complication of the intervertebral disc operation (ab), March, 463
- SNYDER, WILLIAM H., Jr., KRUSE, CHARLES A., GREANEY, E. M., and CHAFFIN, LAWRENCE**: Retroperitoneal tumors in infants and children. Report of eighty-eight cases (ab), June, 911
- SOBEL, ALBERT E.** See **GRIBETZ, DONALD**
- SODIUM RADIOACTIVE.** See **Radioactivity**
- SOKOL, KENNETH.** See **O'CONNOR, VINCENT J.**
- SOLOMON, SAUL**: Silicosis among iron foundry workers (ab), April, 603
- SOMMERS, SHELDON C., WILSON, JOAN C., and HARTMAN, FRANK W.**: Lymphoid lesions in poliomyelitis (ab), April, 636
- SONNENSCHNEN, ARNOLD**: A rare form of malignant joint tumor (ab), June, 920
- SORENSEN, JEANETTE A.** See **REID, ALLEN F.**
- SOUDERS, CARLTON R., PEARSON, CARL M., and ADAMS, HERBERT D.**: An aortic deformity simulating mediastinal tumor: a subclinical form of coarctation (ab), June, 909
- SOUTHARD, SAMUEL C., DeSANTIS, ADOLPH G., and WALDRON, ROBERT J.**: Hemangioma associated with thrombocytopenic purpura. Report of a case and review of the literature (ab), June, 917
- SPACE**
—radiation effects on man in space [including Takata reaction] (ab), Konrad Buettner, April, 633
- SPEAR, PAUL W.** See **MATZNER, MILTON J.**
- SPHENOID BONE**
—air cells in great wing (ab), Russell Wigh, May, 756
- SPINAL CANAL ROENTGENOGRAPHY**
See also **Spine**; **intervertebral disks**
—contrast myelography with emulsified Pantopaque (ab), William A. Nosik, Feb., 305
—indications for contrast visualization of space-occupying processes in spinal canal (ab), Georg Haussler, April, 613
—simple accurate plane and incline indicator, A. L. L. Bell and Jerome Zwanger, Feb., 259

SPINAL CORD

- chronic hypertrophic spondylosis of cervical spine with compression of spinal cord and nerve roots (ab), Joseph A. Epstein and Leo M. Davidoff, June, 907
- importance of congenital toxoplasma infection for the etiologic x-ray diagnosis of organic defects of central nervous system (ab), Johannes Schoeps, Jan., 129
- myelographic defects of herniated disks simulating cauda equina neoplasms (ab), Abraham Kaplan and A. L. Umansky, Feb., 305
- spinal tumors diagnosed during first year of life; case (ab), William H. Mosberg, Jr., Feb., 306

SPINE

- chondromalacic spondylosis (ab), E. Günsel, April, 616
- chronic hypertrophic spondylosis of cervical spine with compression of spinal cord and nerve roots (ab), Joseph A. Epstein and Leo M. Davidoff, June, 907
- intrathoracic meningocele, spinal deformity, and multiple neurofibromatosis (ab), A. W. Lipmann Kessel, Jan., 135
- migraine headache: analysis of 124 cases treated by head-traction manipulation and thiamin chloride (ab), Murray M. Braaf, Feb., 305
- pulmonary cardiac failure (from deformity of spine and/or thorax); case (ab), W. F. O'Connell and Y. C. Lee, Feb., 291
- vertebral manifestations of malignant lymphoma, myeloid leukemia, and multiple myeloma (ab), Robert Mazet, Jr., March, 464

arthritides

- ankylosing spondylitis; observations on 100 cases (ab), L. J. A. Parr, et al., March, 462
- importance of radiotherapy in treatment of ankylosing spondylitis (ab), J. Jackson Richmond, June, 917
- manubrio-sternal joint in ankylosing spondylitis (ab), Douglas L. Savill, Jan., 149
- pelvic and extrapelvic osteopathy in rheumatoid spondylitis: clinical and roentgenographic study of 90 cases (ab), C. Maynard Guest and Harold G. Jacobson, April, 615

curvature

- angular dorsolumbar kyphosis as an unrecognized skeletal sign of congenital myxedema (ab), W. Swoboda, Jan., 149

diseases

- actinomycosis of bone, with special reference to infection of vertebral column (ab), V. Zachary Cope, April, 614
- advanced actinomycosis treated with penicillin and streptomycin; case (ab), M. S. Brett, April, 614
- Kummell's disease (ab), Howard H. Steel, Jan., 148
- paratyphoid spondylitis with paravertebral and epidural abscess; case (ab), H. W. Sung and H. C. Tseng, April, 615

dislocations

- dysplasia of vertebra (study of pathogenesis of spondylolisthesis) (ab), J. E. W. Brocher, Jan., 148
- spondylolysis: clinical-radiological study of 93 cases (ab), A. P. Lachapelle and Claude Lagarde, April, 616

intervertebral disks

- discography of dissecting transosseous ruptures of disks in lumbar region (ab), K. Lindbom, May, 781
- lumbar spinal arachnoiditis; complication of disk operation (ab), Edmund A. Smolik and Francis P. Nash, March, 463
- myelographic defects of herniated disks simulating cauda equina neoplasms (ab), Abraham Kaplan and A. L. Umansky, Feb., 305
- protrusions of lumbar disks; clinical review based on 500 cases treated by excision of protrusion (ab), John E. A. O'Connell, Jan., 150
- radiographic findings in protruded cervical disks (ab), Robert D. Moreton and George Ehni, May, 781
- surgical treatment of herniated lumbar disks; follow-up study of 130 patients without spinal fusion (ab), Karl S. Alfred, March, 463
- x-ray examination in lumbar prolapse by means of Kovács lumbo-inguinal projection (ab), P. Kroker, April, 613

roentgenography

- demonstration of atlanto-epistropheal joints and transverse processes of atlas and second cervical vertebra (ab), C. Buetti, April, 622
- roentgen pattern of infantile spine (ab), R. Seyss, May, 781
- x-ray examination (ab), Alfred O. Miller, May, 780
- tuberculosis
 - tuberculostatic treatment of foci (ab), J. Kastert, April, 615
- tumors
 - ossifying chondromatosis of spine with secondary reticulo-sarcomatosis (ab), G. Lehmann and F. Leicher, Jan., 149
 - vertebral hemangioma with compression of spinal cord; case treated with roentgen rays with good clinical results (ab), Inge Lindqvist, April, 630

SPINAL CHNIC AREA. See Viscera

SPLEEN

- liver and spleen visualization by a simple roentgen contrast method (ab), Samuel Zelman, Jan., 144
- two cases of hepatosplenography with Thorotrast, injected 16 and 14 years ago, respectively (ab), L. Arrieta Sánchez, March, 458

- SPOHN, PETER H., and CAMPBELL, C. GORDON: Persistent vomiting due to cardio-oesophageal relaxation in infancy (ab), Jan., 140
- SPONDYLITIS. See Spine
- SPONDYLOLISTHESIS. See Spine
- SPONDYLOLYSIS. See Spine
- SPONDYLOSIS. See Spine

- SPRINGETT, V. H.: Results of re-examination by mass radiography (ab), June, 893

SPUTUM

- “positive sputum” without pulmonary tuberculosis; pitfalls of positive sputum interpretation, with 8 clinico-roentgen observations (ab), Louis Schneider and Daniel Widolek, April, 602

- SQUIRE, FAY H., and KRETSCHMER, HERMAN L.: Limitations of roentgen rays in diagnosis of bladder stone (ab), Jan., 154

- STAFNE, EDWARD C.: Dental roentgenologic manifestations of systemic disease. I. Endocrine disturbances, Jan., 9
- Dental roentgenologic manifestations of systemic disease. II. Developmental disturbances, April, 507
- Dental roentgenologic manifestations of systemic disease. III. Granulomatous disease, Paget's disease, acrocleroses and others, June, 820

- STAMPFLL, W. P. See WOLLGAST, G. F.

- STANLEY, ROBERT R. See FISHER, SAMUEL H.
- STAPLETON, J. G., and JAMES, E. C.: Alveolar cell tumour of the lung (ab), April, 603

- STAR, PAUL. See YETTER, MAURICE

- STAUS, H. K.: Osteogenic sarcoma arising in traumatic hemithorax and hematoma of the thoracic wall. Case report (ab), May, 776

STEATORRHEA

- Looser-Milkman syndrome; occurrence in case of idiopathic steatorrhea (ab), Christopher Strang, March, 461

- STEEL, HOWARD H.: Kummell's disease (ab), Jan., 148

- STEEN, OLIVER T., and McCULLOUGH, J. A. L.: Supraspinatus tendinitis: a survey of 300 consecutive cases treated by roentgen therapy (ab), Jan., 156

- STEER, ARTHUR. See HAUSER, THEODORE E.

- STEINBACH, HOWARD L. See GAINES, WALTER

- STEINBERG, ISRAEL, MCCOY, HERBERT I., and DOTTER, CHARLES T.: Angiocardiographic findings in pulmonary tuberculosis (ab), April, 602

- See MCCOY, HERBERT I.

- See DOTTER, CHARLES T.

- See HONIG, EDWARD I.

- See HORGER, EUGENE L.

- STEMPIEN, STEPHEN J. See WEINBERG, JOSEPH

STERILITY

- hysterosalpingography with a water-soluble medium in investigation of infertility (ab), Mary Pollock and Ella Freiskel, April, 618
- progress in gynecologic roentgen diagnosis with special consideration of sterility (ab), H. Goecke, Jan., 151

STERNUM

- manubrio-sternal joint in ankylosing spondylitis (ab), Douglas L. Savill, Jan., 149

- STEWART, ALICE, and HUGHES, J. P. W.: Mass radiography findings in the Northamptonshire boot and shoe industry, 1945-6 (ab), March, 446

- STEWART, HAL B. See MORGAN, RUSSELL H.

- STIENNON, ARTHUR: Pneumatosis intestinalis in the newborn (ab), April, 607

- STILSON, WALTER L. See DEER, PAUL H.

- STOCKHOLM METHOD. See Uterus, cancer

- STODDARD, LELAND D. See CASSEL, CHESTER

STOMACH

- See also Gastro-Intestinal Tract; Hernia; Pylorus
- cardiospasm simulating mediastinal tumors (ab), Herbert M. Perr, March, 456

- chronic intrinsic obstruction of stomach and duodenum in newborn (ab), Clifford D. Benson and John J. Coury, May, 769

- gastric actinomycosis; case (ab), H. G. Schmitt, Jan., 141
- neurovascular mechanism of stomach and duodenum (ab), H. B. Benjamin, Feb., 294

- persistent vomiting due to cardio-esophageal relaxation in infancy (ab), Peter H. Spohn and C. Gordon Campbell, Jan., 140
- production of hypochlorhydria by beta radiation of stomach (ab), D. M. Douglas, et al., May, 796

- serial gastric biopsy studies in case of duodenal ulcer treated by deep x-ray therapy (ab), R. K. Doig, et al., April, 630

cancer

- (ab), Stanley E. Lawton, et al., Jan., 141
- benign giant gastric rugae complicated by submucosal gastric carcinoma; case (ab), Milton J. Matzner, et al., May, 769

- prolapsing gastric mucosa through gastrojejunostomy simulating cancer (ab), Bernard M. Maisel and Sidney Weintraub, April, 606

diverticula

- high diverticula (ab), H. R. Beck, Jan., 141

fistula. See Fistula

foreign bodies

- perforation of gastric ulcer secondary to trichobezoar; case in which patient survived (ab), John D. Osmond, Jr., and Jay B. Price, Feb., 295
- trichobezoar in children; review of literature and report of 2 cases (ab), Sidney Hurwitz and Paul F. McAlenuey, June, 903

mucosa

- benign giant gastric rugae complicated by submucosal gastric carcinoma; case (ab), Milton J. Matzner, et al., May, 769
- heterotopic gastric mucosa in esophagus with ulceration and stricture formation (ab), Lewis H. Bosher, Jr., and Frederick H. Taylor, Feb., 294

STOMACH, mucosa—cont.

- prolapsed mucosa (ab), David B. Corcoran and K. K. Wallace, Jan., 141
- prolapsed mucosa through gastrojejunostomy simulating cancer (ab), Bernard Maisel and Sidney Weintraub, April, 606
- prolapsed redundant mucosa (ab), Galen M. Tice and Thomas G. Orr, Feb., 295
- retrograde extrusion or prolapse of mucosa into esophagus (ab), Maurice Feldman, June, 901

roentgenography

- gastric double contrast (ab), Cesare Gianturco, April, 606
- inflation of stomach with double contrast (ab), Francis F. Ruzicka, Jr., and Leo G. Rigler, Feb., 294
- localized walled-off gas pockets due to perforation complicating peptic ulceration (ab), Samuel M. Gilbert, May, 770

syphilis

- (ab), Paul S. Fancher, June, 903

tuberculosis

- Walter Gaines, Howard L. Steinbach, and Elizabeth Lowenhaupt, June, 808

tumors

- clinical manifestations and diagnosis of lymphosarcoma and round-cell sarcoma (ab), O. Walther, June, 902
- cytologic and radiologic observations in lymphosarcoma; case (ab), K. F. Ernst, et al. March, 456
- gastric polyposis (ab), Mark C. Wheelock, et al. April, 606
- leiomyoma (ab), Samuel F. Marshall and William A. Meissner, May, 769
- roentgen manifestations of lymphosarcoma, Paul H. Deeb and Walter L. Stilson, April, 529
- villous tumor: clinical review and report of 2 cases (ab), L. Walk, Feb., 295

ulcers. See Peptic Ulcer

- See SCOTT, KENNETH G.

STOREY, CLIFFORD F.: Encapsulated pleural effusion simulating mediastinal tumor, March, 408

—and **KURTZ, L. D.:** Congenital hernia through the dome of the right diaphragm in an adult (ab), Feb., 300

STOREY, R. H. See FURTH, JACOB

STRANG, CHRISTOPHER: Looser-Milkman syndrome: occurrence in a case of idiopathic steatorrhea (ab), March, 461

STRASSBURGER, PAUL, GABER, C. ZENT, and HALLOCK, HALFORD: Fibrous dysplasia of bone (ab), March, 460

STRATEMEIER, EDWARD H. See RUBIN, SIDNEY

STRATIGRAPHY. See Body Section Roentgenography

STRELINGER, ALEXANDER: Incomplete obstruction of the small intestine (ab), Jan., 143

STREPTOMYCIN. See Spine, diseases

STRELCZYK, ROBERT. See ROTHSTEIN, EMIL

STUMPF, P.: Contractile dysfunction of the heart in kymography (ab), April, 605

STURGE-WEBER SYNDROME. See Tumors, angioma

STURGIS, SOMERS H., DeMUYLDER, EDGARD and MEIGS, JOE V.: Uptake of labelled phosphorus by cancer of the cervix. Preliminary report (ab), Feb., 317

SUBARACHNOID SPACE. See Meninges

SUNG, H. W., and TSENG, H. C.: Paratyphoid spondylitis with paravertebral and epidural abscess. Report of a case (ab), April, 615

SURGERY

- treatment of certain postoperative cicatrices, particularly those following plastic surgery: use of roentgen and radium rays (ab), E. Daubresse, March, 476

SUTTON, DAVID, and LIVERSEDGE, L. A.: Radiological and pathological aspects of tuberosus sclerosis, with special reference to hydrocephalus (ab), March, 443

SWEENEY, BERNARD J., DAUGHADAY, WILLIAM H., GOTTILIEB, LEO, SCOTT, WENDELL G., and MacBRYDE, CYRIL M.: Radioactive iodine therapy of hyperthyroidism: determination of optimum dosage (ab), June, 918

SWICK, M.: Nonopaque roentgenographic and water-repellent examining table mat (ab), May, 788

SWINGLE, ROY C. See SCHWARTZ, NATHANIEL H.

SWOBODA, W.: Angular dorsolumbar kyphosis as an unrecognized skeletal sign of congenital myxedema (ab), Jan., 149

SYLWAN, TORE: Percutaneous retrograde phlebography of the leg (ab), May, 786

SYMONS, CECIL. See PYKE, DAVID

SYNOVIAL MEMBRANE

- pigmented villonodular synovitis; 7 cases (ab), Sid J. Shafer and William A. Larson, April, 617

—synoviomia, with special reference to clinical and roentgenologic aspects (ab), DeForest E. Hale, April, 617

—synovial sarcoma: clinical impression obtained from study of 13 cases (ab), Kirk J. Anderson, March, 462

SYNOVIOMA. See Synovial Membrane

SYPHILIS. See Lungs; Stomach

SYRINGE

- wired for automatic x-ray exposure, Nathan Flax and Robert Waldron, May, 726

T

TAILLENS, J.-P.: The value of bronchologic information in the diagnosis of bronchial cancer. Indications for bronchoscopy (ab), June, 895

TAKATA, MAKI: On the regular and constant behavior pattern of the flocculation test following roentgen irradiation in man (ab), Feb., 324

TAKATA'S FLOCCULATION TEST. See Blood, colloids

TALIPES CALCANEVALGUS. See Foot

TARSUS. See Foot

TAUSSIG SYNDROME. See Heart, abnormalities

TAYLOR, ALLEN. See GLENN, JOHN C., Jr.

TAYLOR, FREDERICK H. See ACKERMAN, LAUREN V.

—See BOSHER, LEWIS H., Jr.

TAYLOR, HENRY K. See PARISER, SANFORD

TAYLOR, J. G. See ELLIS, V. H.

TEACHING

- continuation course in x-ray for general physicians, Jan., 116

- course in essential physics in radiology (University of Southern California), Feb., 274

- isotope courses, Oak Ridge, March, 429

- postgraduate course in roentgenographic interpretation of diseases of bones and joints, Jan., 115

- second international course in stratigraphy, Genoa, Italy, May, 742

- training courses in radiological health, Jan., 116

TEALL, CECIL G.: Malignant disease in childhood (ab), June, 911

TEETH

- dental manifestations of systemic disease (ed), June, 883

- dental roentgenologic manifestations of systemic disease. I. Endocrine disturbances, Edward C. Stafne, Jan., 9

- dental roentgenologic manifestations of systemic disease. II. Developmental disturbances, Edward C. Stafne, April, 507

- dental roentgenologic manifestations of systemic disease. III. Granulomatous disease, Paget's disease, acroscerosis and others, Edward C. Stafne, June, 820

TELANGIECTASIA

- pulmonary arteriovenous aneurysms and their relation to Osler's disease (ab), Chr. Hedinger, et al., May, 764

TELEPAQUE. See Gallbladder, roentgenography

TEMPLETON, F. E., and ADDINGTON, E. A.: Roentgenologic examination of the colon using drainage and negative pressure, with special reference to the early diagnosis of neoplasm (ab), Feb., 297

TEMPORAL BONE

- arteriovenous fistula between middle meningeal artery and greater petrosal sinus (ab), Edgar F. Fincher, May, 787

TENDONS

- calcaneous tendinitis of the flexor carpi ulnaris (ab), Alexander P. Aitken and H. Kelvin Magill, Feb., 306

- giant-cell tumors of tendon sheath origin; consideration of bone involvement; 2 cases with extensive destruction (ab), A. G. Fletcher, Jr., and Robert C. Horn, Jr., Feb., 307

- supraspinatus tendinitis; survey of 300 consecutive cases treated by roentgen therapy (ab), Oliver T. Steen and J. A. L. McCullough, Jan., 136

TENEBLATT, WILLIAM, and HORTON, CHARLES: Hodgkin's disease and pregnancy. Review of the literature and report of a case (ab), Feb., 315

TERATOMA. See Tumors, teratoma

TERRAFRANCA, RAYMOND J., and ZELLIS, ALLAN: Rhinolith, March, 405

TESTES

- changes in cell morphology and histochemistry of testis following irradiation and their relation to other induced testicular changes. I. Quantitative random sampling of germinal cells at intervals following direct irradiation. II. Comparison of effects of doses of 1,440 r and 5,050 r with 30 r (ab), Lloyd C. Fogg and Russell F. Cowing, Feb., 323

- malignant disease, with special reference to radiotherapy (ab), T. M. Prosser, March, 475

- malignant tumors (ab), P. F. J. Hickinbotham, March, 475

- tumors: diagnosis and treatment (ab), Archie L. Dean, Feb., 314

TETRAIODOPHENOLPHTHALEIN. See Gallbladder

TEYSSIER. See PRUVOST, P.

THIAMIN CHLORIDE. See Vitamins, B

THIOCYANATE

- significance of radiosodium space in human disease: comparison with thiocyanate space (ab), Jerry K. Aikawa, June, 920

THIOURACIL. See Thyroid, hyperthyroidism

THOMPSON, ACORS, W., and SHAFER, JUNE C.: Congenital vascular anomalies (ab), Feb., 309

THOMPSON, GERSHOM J., and COUNSELLER, VIRGIL S.: Salpingovaginal fistulae. Report of case (ab), May, 781

THOMPSON, JOHN J. See KLOSTERMYER, LOUIS L.

THOMPSON, VERNON P., and EPSTEIN, HERMAN C.: Traumatic dislocation of hip. A survey of 204 cases covering a period of twenty-one years (ab), June, 908

THOMSEN, GREGERS, and VESTERDAL, JØRGEN: Atypical Hurler's syndrome. Report of 3 cases with a discussion of the differential diagnosis (ab), April, 613

THORACOPLASTY. See Tuberculosis, Pulmonary

THORAX

- See also Heart; Hemithorax; Hydrothorax; Lungs; Mediastinum; Ribs; etc.

- comparative study of x-ray transmission in thorax and abdomen in living subjects, Joseph R. Nahon and Carrol P. Naidorf, Feb., 241

- osteogenic sarcoma arising in traumatic hemithorax and hematoma of thoracic wall; case (ab), H. K. Stauss, May, 776

THORAX—cont.

- pulmonocardiac failure (from deformity of spine and/or thorax); case (ab), W. F. O'Connell and V. C. Lee, Feb., 291
- roentgenography. See also Mass Surveys
- surgical treatment of circumscribed intrathoracic lesions: lesions found on routine thoracic roentgen examinations, with absence of subjective symptoms (ab), Stuart W. Harrington, May, 762
- transverse tomogram of normal thorax: contribution to topographical anatomy in living man (ab), Alfred Gebauer, Jan., 130

tumors

- intrathoracic axillary neurinoma (ab), P. Pruvost, et al, Feb., 290
- neurogenous tumors within thorax: clinico-pathological evaluation of 48 cases (ab), Lauren V. Ackerman and Frederick H. Taylor, June, 895
- x-ray findings in extensive angiomatous changes in region of right upper half of body (ab), G. Bonse, Jan., 147

THOROTRAST (THORIUM DIOXIDE)

- injuries (ab), K. W. Groskopf, et al, June, 912
- late effects of thorium dioxide in man (ab), Chester Cassel, et al, May, 788
- Thorotrast in kidney 11 years after pyelography (ab), K. Breckoff, April, 619
- two cases of hepatosplenography with Thorotrast, injected 16 and 14 years ago, respectively (ab), L. Arrieta Sánchez, March, 458

THROMBOANGITIS OBLITERANS

- causes of failure of suprarenalomy and ganglionectomy on basis of 895 operations (ab), René Leriche, Feb., 310

THROMBOCYTOPENIA

- hemangioma associated with thrombocytopenic purpura: report of case and review of literature (ab), Samuel C. Southard, et al, June, 917
- hemangioma with purpura, thrombocytopenia and erythrocytopenia (ab), Maxwell Bogin and James Thurmond, April, 630

THROMBOPHLEBITIS

- venography of leg, with particular reference to acute deep thrombophlebitis and to gravitational ulceration (ab), J. D. Dow, March, 468

THROMBOSIS

- deliberate thrombosis of intracranial arterial aneurysm by partial occlusion of carotid artery with arteriographic control: preliminary report of case (ab), Arthur Ecker and Paul Riemenschneider, March, 441
- of internal carotid artery, Robert Shapiro, Jan., 94

THUMB

- triphalangeal thumb (ab), Henry Milch, June, 908

THURMOND, JAMES. See BOGIN, MAXWELL**THURNHER, B. See GARBBSCH, H.****THYMUS**

- large thymic tumor simulating pericardial effusion (ab), Arthur Bernstein, et al, March, 452

THYROID

- accurate method for measurement of radioiodine in thyroid gland by an external counter, Theodore Fields and George V. LeRoy, Jan., 57
- dental roentgenologic manifestations of systemic disease. I. Endocrine disturbances, Edward C. Stafne, Jan., 9
- effect of complete ablation of thyroid tissue by radioactive iodine on survival of tumor-bearing mice (ab), Henry A. Sloviter, April, 631
- effect of thyroid hormone on radiation lethality (ab), Willie W. Smith and Falconer Smith, April, 635
- effective thyroid depth and compensating measurements for iodine uptake determination, Allen F. Reid and Jeanette A. Sorenson, March, 390
- effects of thyroid and radiation on sensitivity to hypoxia, basal rate of O_2 consumption, and tolerance to exercise (ab), Willie W. Smith and Falconer Smith, April, 636
- scintillation counter as an instrument for *in vivo* determination of thyroid weight, Herbert C. Allen, Jr., and William E. Goodwin, Jan., 68
- scintillation counter in clinical studies of human thyroid physiology using I^{131} (ab), Herbert C. Allen, Jr., et al, April, 631
- skeletal changes resembling scurvy in infantile hypothyroidism before and after thyroid therapy (ab), Arne Engeset, et al, May, 778
- high-neck clearance: simplified radioactive test of thyroid function (ab), J. B. Foote and N. F. MacLagan, May, 793
- tumor-host studies. Alteration of thyroid, skin, blood, and tumor uptake of I^{131} -tagged diiodotyrosine in rats by transplanted tumors (ab), Kenneth G. Scott and Robert S. Stone, Feb., 320
- uptake of radioactive iodine after intravenous administration of tracer doses (ab), Joseph P. Kriss, Feb., 317
- cancer
 - malignancy in adenoma (ab), Frank H. Lahey and Hugh F. Hare, Feb., 312
 - metastasizing adenoma (ab), H. Fetzner, May, 790
 - osseous metastases of adenocarcinoma (ab), Leonard Barnard, Feb., 317
 - treatment of carcinoma with radioactive iodine (I^{131}) (ab), A. Stone Freedberg, et al, June, 919
- hyperthyroidism
 - polyostotic fibrous dysplasia associated with hyperthyroidism (ab), Maurice Yetta and Paul Starr, Feb., 303

- radioactive iodine therapy: determination of optimum dosage (ab), Bernard J. Sweeney, et al, June, 918
- treatment: evaluation of thyroidectomy, of prolonged administration of propyl thiouracil, and of radioactive iodine (ab), George Crile, Jr., and E. Perry McCullagh, June, 918
- without apparent hypermetabolism (ab), Sidney C. Werner and Howard Hamilton, May, 793

tumors

- treatment with divided doses of radioactive iodine (ab), George Crile, Jr., Feb., 317

TIBIA

- congenital curvature (ab), Max S. Rabinowitz, March, 465
- congenital posterior bowing, with talipes calcaneo-valgus (ab), B. P. Miller, Jan., 151
- fatigue fractures (ab), Robert P. Kelly and Fred E. Murphy, March, 465
- march fracture, Paul O. Wells, May, 714

TICE, GALEN M., and ORR, THOMAS G.: Prolapsing redundant gastric mucosa (ab), Feb., 295**TIPPETT, G. O.: Atlanto-axial fracture-dislocation (ab) Jan., 148****TOCHILIN, EUGENE. See HOLDEN, FRANCIS R.****TOD, MARGARET C.: Place of x-ray therapy in the treatment of malignant ovarian tumours (ab), April, 629****TOMOGRAPHY. See Body Section Roentgenography****TONGUE**

- cancer (ab), Leonardo Guzmán, March, 472
- fibrosarcoma, after interstitial irradiation; case (ab), Peter Edler, May, 795

TOOST, M. H.: Histological and chemical alterations produced in mouse epidermis by soft x-radiation (ab), April, 634**TORKILDSEN, A., and KOPPANG, K.: Notes on the collateral cerebral circulation as demonstrated by carotid angiography (ab), March, 441****TORULOSIS**

- generalized torulosis with bone involvement (ab), Morris F. Wiener, March, 460

TOXOPLASMOSIS

- importance of congenital toxoplasma infection for the etiologic x-ray diagnosis of organic defects of central nervous system (ab), Johannes Schoeps, Jan., 129

TRACHEA

- bronchial adenoma in supernumerary tracheal lobe; unusual case (ab), Isaac Epstein, March, 448
- generalized softening in tracheobronchial system (ab), R. Pohl, Jan., 134
- stereoscopic roentgen study regarding the influence of goiter on anatomy and topography of tracheobronchial tree (ab), H. Brückner, Feb., 287

fistula. See Fistula**TRANSVERSE SINUS**

- diversion of venous blood flow through transverse sinuses in one-sided innominate vein obstruction, A. Schwartz and M. Fraenkel, May, 738

TREMAINE, MYRON J., O'CONNOR, VINCENT J., and MADDOCK, WALTER G.: Intestinal gas during pyelography (ab), May, 784**TRICHOBEZOAR. See Stomach, foreign bodies****TRICUSPID VALVE**

- atresia; 3 cases and evaluation of diagnostic criteria (ab), Herbert L. Abrams and Robert H. Alway, March, 453

TROUNCE, J. R. See DE NAVASQUEX, S. J.**TRUMBLE, HUGH C.: Pituitary tumours: observations on large tumours which have spread widely beyond the confines of the sella turcica (ab), May, 755****TRUMP, J. G. See EVANS, W. W.****TRUNCUS BRACHIOCEPHALICUS. See Arteries, innominate****TSENG, H. C. See SUNG, H. W.****TUBERCULOSIS. See Kidneys; Lymph Nodes; Spine; Stomach; Tuberculosis, Pulmonary****TUBERCULOSIS, PULMONARY**

- angiocardigraphic findings (ab), Israel Steinberg, et al, April, 602
- angiocardigraphic findings in thoracoplasty, artificial pneumoperitoneum, and phreniclasia (ab), Herbert I. McCoy, et al, Jan., 137
- artificial pneumothorax: statistical analysis of 557 cases initiated in 1930-1939 and followed in 1949. I. Influence of clinical findings before induction on early and late results. II. Fate of contralateral lung. III. Influence of features of management after induction on early and late results (ab), Roger S. Mitchell, May, 759
- bilateral tuberculous bronchostenosis in patient with normal chest roentgenographic findings (ab), John S. Packard, April, 602
- bronchogenic carcinoma masked by tuberculosis; case (ab), J. R. Phillips and J. W. Morrison, Jan., 132
- classification with five digit code (ab), B. Papanicolaou, April, 600
- new roentgen sign of broncho-extrapleural perforation in lucite plombage (ab), Allen Hurst and Morris A. Levine, June, 894
- tuberculous cavities of lower lobe; results of treatment in 103 patients (ab), John S. Chambers, Jr., April, 601
- mass roentgenologic surveys. See also Mass Surveys
 - chest survey in large general hospital (ab), Harold C. Ochsner, March, 446
 - mass radiographic findings in Northamptonshire boot and shoe industry, 1945-6 (ab), Alice Stewart and J. P. W. Hughes, March, 446
 - results of re-examination by mass radiography (ab), V. H. Springett, June, 893

TUBERCULOSIS, PULMONARY—cont.

- roentgenography
 - bronchography (ab), G. Ibers, et al, May, 757
 - studies on value of serial films in estimating the progress of pulmonary disease, L. H. Garland, E. R. Miller, H. B. Zwerling, J. T. Harkness, H. C. Hinshaw, S. J. Shipman, and J. Yerushalmi, Feb., 161

TULLIS, JOHN L. See BARROW, JACK**TUMORS**

- See also Cancer; Sarcoma; under organs and regions
- neoplastic alterations in the ribs: roentgen diagnostic contribution (ab), Bruno Bertiglia, Jan., 148
- adenoma.** See also Thyroid, cancer
 - chromophobe pituitary adenomas: surgical and radiation treatment (ab), Gilbert Horrax, May, 789
 - contributions to pathological picture of bronchial adenoma (ab), H. Finke, May, 763
 - pulmonary adenomatosis; 2 cases (ab), Edwin W. Peterson and John D. Houghton, Feb., 289
 - pulmonary adenomatosis (alveolar-cell tumors); 2 cases, Robert W. Lackey, Feb., 215
 - solitary pulmonary adenoma (focal pulmonary adenomatosis); 3-year follow-up after resection (ab), George P. Rosemond, et al, May, 762
- angiofibroma**
 - juvenile nasopharyngeal angiofibroma (ab), R. W. Kerwin, Feb., 315
- angioma**
 - cystic lymphangioma of mediastinum (ab), P. Santy, et al, Feb., 291
 - hemangioma associated with thrombocytopenic purpura; report of case and review of literature (ab), Samuel C. Southard, et al, June, 917
 - hemangioma with purpura, thrombocytopenia, and erythrocytopenia (ab), Maxwell Bogin and James Thurmond, April, 630
 - hemangiomas: classification, diagnosis and treatment (ab), George T. Pack and Theodore R. Miller, Feb., 314
 - lymphangitic carcinomatosis of lungs; 6 case reports and review of literature (ab), Theodore E. Hauser and Arthur Steer, March, 447
 - Maffucci's syndrome (dyschondroplasia with hemangiomas); case with early osseous changes (ab), J. Fred Mullins and Clarence S. Livingood, Feb., 304
 - Sturge-Weber syndrome: radiographic findings in 14 cases (ab), Giovanni Di Chiro and Erik Lindgren, April, 598
 - vertebral hemangioma with compression of spinal cord; case treated with roentgen rays with good clinical results (ab), Inge Lindqvist, April, 630
 - x-ray findings in extensive angiomatous changes in region of right upper half of body (ab), G. Bonse, Jan., 147
- astrocytoma**
 - astrocytoma Grade III associated with profuse subarachnoid bleeding as its first manifestation; case (ab), Richard L. DeSaussure, Jr., et al, Feb., 284
- chondroma**
 - ossifying chondromatosis of spine with secondary reticulocarcinomatosis (ab), G. Lehmann and F. Leicher, Jan., 149
- experimental**
 - effect of a carcinogenic azo dye on radiophosphorus turnover in rat-liver nuclei and cytoplasm (ab), A. Clark Griffin, et al, Feb., 320
 - effect of complete ablation of thyroid tissue by radioactive iodine on survival of tumor-bearing mice (ab), Henry A. Sloviter, April, 631
 - mammary-tumor incidence in female C3Hb mice following long continued gamma irradiation (ab), Egon Lorenz, et al, Feb., 322
 - quantitative evaluation of growth rates in tumors before and after radiation (ab), Anna Goldfeder, Feb., 322
 - tissue localization and excretion routes of radioactive diethylstilbestrol (ab), Gray H. Twombly and Erwin F. Schoenewaldt, Feb., 320
 - tumor-host studies. Alteration of thyroid, skin, blood, and tumor uptake of 131 I-tagged diiodotyrosine in rats by transplanted tumors (ab), Kenneth G. Scott and Robert S. Stone, Feb., 320
- fibroma**
 - non-osteogenic fibroma of jaw (ab), C. Agazzi and L. Belloni, May, 780
 - ossifying fibroma of frontal sinus (ab), Simon Ball, Feb., 285
- fibromyoma**
 - esophageal fibromyoma associated with diverticulum (ab), Robert M. Hoyne and J. C. T. Rogers, May, 767
- giant-cell**
 - of tendon sheath origin; consideration of bone involvement; 2 cases with extensive destruction (ab), A. G. Fletcher, Jr., and Robert C. Horn, Jr., Feb., 307
- lipoma**
 - of gastro-intestinal tract (ab), Kenneth W. Warren and Frederick H. Brandenburg, May, 768
- lymphangioma.** See Tumors, angioma
- melanoma**
 - arteriography in 2 cases of malignant tumors (melanoma and neurinoma) (ab), Torfinn Denstad, March, 469
- myeloma.** See Bones, marrow; Tumors, plasmocytoma
- myoma**
 - leiomyoma of stomach (ab), Samuel F. Marshall and William A. Meissner, May, 769
- neurinoma**
 - arteriography in 2 cases of malignant tumors (melanoma and neurinoma) (ab), Torfinn Denstad, March, 469
- intrathoracic axillary neurinoma (ab), P. Pruvost, et al, Feb., 290
- neurofibroma**
 - primary solitary neurogenic tumors of lung (ab), Walter Diveley and Rollin A. Daniel, Jr., Jan., 132
- osteochondroma**
 - osteochondromatosis of hip joint (ab), Ross Bloom and J. N. Pattinson, Jan., 150
 - osteochondromatosis of hip joint; case (ab), Gawad Hamada, Jan., 150
- osteoma**
 - orbitoethmoidal osteoma (ab), Bernard G. McKibben and Ernest R. Casey, Jr., March, 445
 - parosteal osteoma; new entity (ab), Charles F. Geschickter and Murray M. Copeland, May, 776
- papilloma**
 - of gallbladder (ab), Francis A. Reynolds, May, 774
- phantom.** See Pelvis
- plasmocytoma**
 - extramedullary plasmocytoma; case (ab), Henry M. Lewis, et al, Feb., 314
- polypi**
 - benign polypoid tumor of esophagus (ab), Andrew F. McBride, Jr., June, 901
 - diffuse familial polyposis of colon (ab), Charles W. Mayo, et al, June, 903
 - gastric polyposis (ab), Mark C. Wheelock, et al, April, 606
 - multiple polyposis of small and large intestines with multiple intussusception; case (ab), Marshall N. Jensen, April, 606
- synovioma.** See Synovial Membrane
- teratoma**
 - mediastinal teratoma (ab), Frank T. Fralick and Hugh S. Welsman, Jan., 135
- villous**
 - of stomach; clinical review and report of 2 cases (ab), L. Walk, Feb., 295
- Wilms'.** See Kidneys, tumors
- xanthoma.** See Xanthoma

- TWOMBLY, GRAY H., and di PALMA, SALVATORE:** Growth and spread of cancer of the cervix uteri (ab), April, 626
- and SCHOENEWALDT, ERWIN F.:** Tissue localization and excretion routes of radioactive diethylstilbestrol (ab), Feb., 320

U

- UEHLINGER, ENRICO:** Gastro-colic fistula of unexplained origin (ab), Feb., 295
- ULCERS.** See Peptic Ulcer; Varicose Veins
- ULNA**
 - growth of shaft of human radius and ulna during first two years of life (ab), Musa K. Ghanous, April, 610
- UMANSKY, A. L.** See KAPLAN, ABRAHAM
- UPHOFF, DELTA.** See LORENZ, EGON
- URELES, ALVIN L.** See FREEDBERG, A. STONE
- URETERS**
 - abnormalities
 - circumcaval uter (ab), John A. Dougherty, May, 785
 - congenital ureteral dilatation with renal hyperparathyroidism (ab), Robert Brendze and R. William Provenzano, May, 785
 - ectopic ureter in childhood, with account of 4 personal cases (ab), A. J. Aldred and T. T. Higgins, March, 467
 - post-caval uter; case preoperatively diagnosed with confirmation at surgery (ab), A. W. Middleton, Feb., 308
 - retrocaval ureter (ab), C. Robert Schmidt, et al, Jan., 153
 - retrocaval ureter; 4 cases and review of literature (ab), John E. Heslin and Christopher Mamonas, Feb., 308
- URETHRA**
 - cancer
 - primary carcinoma of female urethra with metastases (ab), J. S. Eisenstaedt, May, 790
- URINARY TRACT**
 - See also Genito-Urinary Tract; Bladder; Kidneys; etc.
 - abdominal aortography in urology; preliminary report (ab), I. H. Griffiths, March, 466
 - late complications following irradiation of pelvic viscera (ab), William C. White and Frederick W. Finn, May, 795
 - urologic problems in pediatric x-ray diagnosis, Frederic N. Silverman, March, 325
- URINE AND URINATION**
 - incontinence in women: roentgen manifestations, Allan K. Briney and Philip J. Hodes, Jan., 109
 - physiology of micturition (ab), S. Richard Mueller, May, 784
 - urinary excretion of gallium by man and animals (ab), J. I. Munn, et al, May, 794
 - use of radiophosphorus in studies of glomerular permeability of plasma inorganic phosphate (ab), Philip Handler and David V. Cohn, Feb., 320
- UROGRAPHY.** See Kidneys; Pyelography
- UROKON.** See Pyelography
- UTERUS**
 - cancer
 - androgen therapy in control of pulmonary metastasis from adenocarcinoma of corpus uteri; case benefited by androgen therapy (ab), John H. Freed, et al, March, 474
 - cervical cancer; end results of radiation treatment (ab), Herbert E. Schmitz, April, 627
 - cervical cancer; growth and spread (ab), Gray H. Twombly and Salvatore di Palma, April, 626

- UTERUS, cancer—cont.**
- cervical cancer; individualized interstitial irradiation using cobalt⁶⁰ in needles, inserted through a lucite template; progress report (ab), Joseph L. Morton, et al, April, 628
 - cervical cancer; possibilities of radical surgery in cancer recurrent after radiation therapy (ab), Alexander Brunschwig, April, 628
 - cervical cancer; radiation treatment (ab), James F. Nolan and Lucille Du Sault, April, 627
 - cervical cancer; results of surgical treatment (ab), Joe V. Meigs, April, 627
 - cervical cancer; uptake of labelled phosphorus; preliminary report (ab), Somers H. Sturgis, et al, Feb., 317
 - cervical carcinoma; advances in treatment (ab), Michael J. Jordan, Feb., 313
 - cervical carcinoma; correlation of histologic grade, clinical stage, and radiation response (ab), Robert W. Kistner and Arthur T. Hertig, April, 629
 - cervical carcinoma; estimate of dose from radiation applicators used in treatment (ab), Walter Gaines and Norman E. Scofield, Jan., 156
 - cervical carcinoma; factors influencing prognosis in treatment (ab), William E. Costolow and James P. Nolan, Feb., 313
 - cervical carcinoma in pregnancy (ab), R. R. Maier and M. Klein, Jan., 156
 - cervical carcinoma; need for combined radiation and surgical treatment (ab), A. P. Barry, Jan., 155
 - cervical carcinoma; studies of dosage distribution in pelvis in radium treatment according to Stockholm method (ab), H. L. Kottmeier, April, 629
 - endometrial carcinoma (ab), J. H. Randall, et al, Feb., 313
 - late complications following irradiation of pelvic viscera (ab), William C. White and Frederick W. Finn, May, 795
 - cervix.** See Uterus, cancer
 - roentgenography.** See Fallopian Tubes
 - tumors**
 - sarcoma of endometrium (ab), James A. Corscaden, March, 473
- VAGINA**
- See also Fistula
 - radiographic diagnosis of hydrocolpos in infants, Louis L. Klostermyer and John J. Thompson, Jan., 100
- VAGOTOMY.** See Nerves, vagus; Peptic Ulcer
- VAN ALLEN, WILLARD W.** Secondary radiation limits in photofluorography (ab), April, 633
- VAN DER PLAATS, G. J., and PONTAINE, J.** Application of the technic of radiologic enlargement to the study of chronic articular affections (ab), Jan., 151
- VAN DYKE, DONALD C., and HUFF, REX L.** Life span of white blood cells as measured in irradiated parabiotic rats (ab), April, 635
- VAN FLEIT, WILLIAM E.** See ABBOTT, OSLER A.
- VAN VACTOR, HELEN D.** See ROSENAK, BERNARD D.
- VARICOSE VEINS**
- deep venous valves in etiology (ab), H. D. Moore, June, 909
 - some points in management (ab), C. H. Wickham Lawes, April, 622
 - venography of leg, with particular reference to acute deep thrombophlebitis and to gravitational ulceration (ab), J. D. Dow, March, 468
- VAUGHN, JOHN O.** See SHELBY, DONALD C.
- VEALE, NORMAN C.** See LEVINE, GEORGE
- VEASY, GEORGE.** See ADAMS, FORREST H.
- VEINS**
- See also Extremities; Phlebitis; Thromboangitis obliterans; Varicose Veins
 - azygos.** See Lungs, abnormalities
 - cardiac**
 - complication following coronary sinus and cardiac vein catheterization in man (ab), J. McMichael and J. P. D. Mounsey, June, 899
 - cerebral**
 - Diodrast studies of vertebral and cranial venous systems to show their probable role in cerebral metastases (ab), Robert Anderson, May, 755
 - innominate**
 - diversion of venous blood flow through transverse sinuses in one-sided innominate vein obstruction, A. Schwartz and M. Fraenkel, May, 728
 - jugular.** See Glomus Jugularis
 - portal.** See Portal Vein
 - pulmonary**
 - anomalous veins (ab), J. Chandler, Feb., 309
 - anomaly; case (ab), Francis N. Cooke, et al, March, 450
 - subclavian**
 - subclavian and anterior scalene muscle compression as cause of intermittent obstruction of subclavian vein (ab), Robert S. McCleery, et al, April, 621
 - vertebral**
 - diodrast studies of vertebral and cranial venous systems to show their probable role in cerebral metastases (ab), Robert Anderson, May, 755
- VENAE CAVAE**
- bilateral superior vena cavae accompanied by patent ductus arteriosus (ab), J. W. C. De Groot, June, 900
 - diagnosis of involvement of inferior vena cava in renal neoplasms (ab), P. A. Duff and W. H. Granger, Feb., 308
 - phlebographic study of constrictive processes in superior vena cava area and of accompanying changes in collateral circulation (ab), Ernst F. Salén, May, 786
 - superior vena caval obstruction with survival after 36 years (ab), Arthur S. Glushien and Matthew M. Mansuy, June, 900
- VENOGRAPHY.** See Extremities; Portal Vein; Varicose Veins; Venae Cavae
- VERHAGEN, AUGUST.** Less common x-ray findings in the sacroiliac joints with lumbago in women (ab), Jan., 150
- VERMOOTEN, VINCENT.** Congenital cystic dilatation of the renal tubules. New disease entity (ab), April, 619
- Renal calculi.** Etiology and differential diagnosis (ab), April, 620
- VERTEBRAE.** See Spine
- VESTERDAL, JØRGEN.** See THOMSEN, GREGERS
- VETERANS**
- beriberi heart in Iowa veterans (ab), Charles H. Gutenkauf, Feb., 292
- VICAS, BENEDICT.** See RIESSE, JOHN F.
- VIETEN, H.** See IBERS, G.
- VILLOUS TUMOR.** See Tumors, villous
- VILVANDRE, G. E.** Osteoporosis circumscripta cranii (ab), Jan., 129
- VISCERA**
- clinical study of visceral lesions and endocrine disturbances of diffuse scleroderma; 8 cases (ab), Javier Robles Gil, March, 470
 - late complications following irradiation of pelvic viscera (ab), William C. White and Frederick W. Finn, May, 795
 - situs inversus of abdominal viscera with levocardia; 8 cases submitted to Blalock-Taussig operation (ab), Maurice D. Young and Herbert E. Griswold, Jan., 136
 - splanchic removal of bacteria from circulating blood of irradiated rabbits (ab), J. Lamar Callaway and Grace P. Kerby, Jan., 160
- VITAMINS**
- A**
 - hypervitaminosis A, with infantile cortical hyperostosis (ab), Irving E. Klineberg and Robert J. Gross, May, 779
 - vitamin A poisoning (ab), Donald Gribetz, et al, Feb., 304
 - B**
 - migraine headache: analysis of 124 cases treated by head-traction manipulation and thiamin chloride (ab), Murray M. Braaf, Feb., 305
- VOGLER, E.** Calcareous cataract in the x-ray picture (ab), Jan., 130
- Syphilis of lung.** Case confirmed by autopsy (ab), Jan., 134
- VOGT, A.** Lymphogranulomatosis of bone (ab), May, 777
- Stenosis of the isthmus of the aorta.** Roentgenkymographic studies of normal and diseased hearts, the great vessels, and transmitted pulsations (ab), Jan., 138
- VOISIN, R.** See DUCUING, J.
- VOLK, B. W., NATHANSON, L., LOSNER, S., SLADE, W. R., and JACOBI, M.** Incidence of lipid pneumonia in a survey of 389 chronically ill patients (ab), Feb., 291
- VOLVULUS.** See Intestines
- VOMITING**
- persistent vomiting due to cardio-esophageal relaxation in infancy (ab), Peter H. Spohn and C. Gordon Campbell, Jan., 140
- W**
- WALDRON, ROBERT.** See FLAX, NATHAN
- WALDRON, ROBERT J.** See SOUTHARD, SAMUEL C.
- WALK, L.** Villous tumor of the stomach. Clinical review and report of two cases (ab), Feb., 295
- WALKER, JOHN W.** Experiences with benign bone tumors in pediatric practice, May, 662
- WALLACE, K. K.** See CORCORAN, DAVID B.
- WALLERSTEIN, ROBERT S.** Multiple myeloma without demonstrable bone lesions (ab), Feb., 304
- WALTERS, N. H.** See MUNN, J. I.
- WALTHER, O.** Clinical manifestations and diagnosis of lymphosarcoma and round-cell sarcoma of the stomach (ab), June, 902
- WANGNER, WILLIAM F.** Fundamentals of interpretation in step kymography, May, 720
- WANTZ, JULIUS B.** (obit), June, 885
- WAPSHAW, H.** See ANDERSON, J. R.
- WARREN, JAMES V.** See WEENS, H. STEPHEN
- WARREN, KENNETH W., and BRADENBURG, FREDERICK H.** Lipomas of the gastrointestinal tract (ab), May, 768
- WARRICK, C. K.** See BREMNER, A. E.
- WASCH, MILTON G., and EPSTEIN, BERNARD S.** Monophen: a new medium for oral cholecystography (ab), June, 912
- WASER, P., and HUNZINGER, W.** Determination of circulation factors with radioactive substances (radiocirculography) (ab), May, 792
- WATERS, LEVIN L.** See LOWMAN, ROBERT M.
- WAYTE, A. B.** Treatment of some disorders of the pituitary by radiotherapy (ab), June, 913
- See DE NAVASQUEX, S. J.
- WEBER, H. H.** Maxillary sinusitis and the post-sinusitic lung syndrome in radiological practice (ab), May, 764
- WEBER-CHRISTIAN DISEASE.** See Panniculitis
- WEBSTER, FREDERICK S., and ROBERTS, WILLIAM M.** Tarsal anomalies and peroneal spastic flatfoot (ab), May, 782
- WEBSTER, J. E., DAWSON, R., and GURDJIAN, E. S.** Diagnosis of traumatic intracranial hemorrhage by angiography (ab), May, 754
- See GURDJIAN, E. S.

- WEED, LYLE A. See HODGSON, CORRIN H.
 WEENS, H. STEPHEN, OLNICK, HERBERT M., JAMES, DAVID F., and WARREN, JAMES V.: Intravenous nephrography: a method of roentgen visualization of the kidney (ab), Feb., 307
 WEGELIUS, C. See KEYES, T. F.
 WEGSTEDT, L. See ENGSTRÖM, A.
 WEIDEN, S. See DOIG, R. K.
 WEINBERG, JOSEPH, KRAUS, ALVIN R., STEMPIEN, STEPHEN J., and WILKINS, FRANKLIN B.: Vagotomy in the treatment of duodenal ulcer: results in three hundred and fifty consecutive cases (ab), Jan., 142
 WEINGRABER, H.: The function test in the early x-ray diagnosis of diseases of the mandibular joint (ab), Jan., 130
 WEINTRAUB, SIDNEY. See MAISEL, BERNARD
 WEIR, DAVID R.: Eosinophilic granuloma of rib (ab), June, 908
 WEISBURGER, ELIZABETH K. See WEISBURGER, JOHN H.
 WEISBURGER, JOHN H., WEISBURGER, ELIZABETH K., and MORRIS, HAROLD P.: Excretion of radioactivity during a four-day period following the feeding of carbon 14-labeled 2-acetylaminofluorene to rats (ab), Jan., 158
 WELKIND, ALLEN. See DOWNING, DANIEL F.
 WELLS, JOHN J.: New position for cholecystography (Kirklin) (ab), March, 458
 WELLS, PAUL O.: March fracture of the tibia, May, 714
 WELSMAN, HUGH S. See FRALICK, FRANK T.
 WERKÖ, L. A. See LARSSON, Y.
 WERNER, SIDNEY C., and HAMILTON, HOWARD: Hyperthyroidism without apparent hypermetabolism (ab), May, 793
 WERNER'S SYNDROME
 —juvenile type of Werner's syndrome; progressive musculo-cutaneous dystrophy observed for 18 years (ab), Donald C. Shelby and John O. Vaughn, March, 461
 WESTDAHL, PHILIP R.: Hysterical abdominal distention simulating acute intestinal obstruction, with report of a case (ab), April, 607
 WETZEL, U., and NORDMANN, S.: Paget's osteitis deformans in the early stage (ab), Feb., 305
 WHEELLOCK, MARK C., ATKINSON, ARTHUR J., and JENNINGS, ROBERT: Gastric polyposis (ab), April, 606
 WHITE, J. WARREN. See GULLEDGE, WILLIAM H.
 WHITE, PAUL. See PARR, L. J. A.
 WHITE, WILLIAM C., and FLYNN, FREDERICK W.: Late complications following irradiation of pelvic viscera (ab), May, 795
 WHITTIER, JOHN R.: Deaths related to pneumoencephalography during a six year period (ab), March, 442
 WIDELÖCK, DANIEL. See SCHNEIDER, LOUIS
 WIEBEN, E. E. See RANDALL, J. H.
 WIENER, MORRIS F.: Generalized torulosis with bone involvement (ab), March, 460
 WIESE, E. ROBERT. See HEIKEN, CHARLES A.
 WIGH, RUSSELL: Air cells in the great wing of the sphenoid bone (ab), May, 756
 WIHMAN, G. See LINDGREN, E.
 WILK, S., and ZÜST, G. E.: Hernia through the foramen epiploicum Winslowi (ab), Feb., 301
 WILKINS, FRANKLIN B. See WEINBERG, JOSEPH
 WILLIAMS, G. E. O. See ASHBY, D. W.
 WILLIAMS, HENRY L. See ANTHONY, WALTER P.
 WILLIAMS, I. G., and CUNNINGHAM, G. J.: Histological changes in irradiated carcinoma of the breast (ab), Feb., 312
 WILLIAMS, ROGER D. See JAMES, ARTHUR G.
 WILLIAMSON, J. C. F. LLOYD. See BICKFORD, B. J.
 WILLIAMSON, WILLIAM P., and WINTER, CALVERT J.: Reversible cerebral atrophy (ab), Feb., 285
 WILLMANN, K. H. See IBERS, G.
 WILMS' TUMOR. See Kidneys, tumors
 WILSON, G. M. See MILLER, H.
 WILSON, HAL T. See KIRSCHBAUM, JACK D.
 WILSON, J. A. See JENKINSON, E. L.
 WILSON, JOAN C. See SOMMERS, SHELDON C.
 WINDEYER, B. W.: Supravoltage radiotherapy (ab), April, 623
 WINDHOLZ, FRANK, KAPLAN, HENRY S., and JONES, HENRY H.: Preliminary studies of the gastrointestinal tract with colloidal barium (ab), March, 455
 WINN, WILLIAM A.: Pulmonary mycoses—coccidioidomycosis and pulmonary cavitation. A study of ninety-two cases (ab), Feb., 290
 WINTER, CALVERT J. See WILLIAMSON, WILLIAM P.
 WISEMAN, BRUCE K., ROHN, ROBERT J., BOURONCLE, BERTHA A., and MYERS, WILLIAM G.: Treatment of polycythemia vera with radioactive phosphorus (ab), Jan., 157
 WISH, LEON. See FURTH, JACOB
 WISHAM, L. H., YALOW, R. S., and FREUND, A. J.: Consistency of clearance of radioactive sodium from human muscle (ab), June, 920
 WOELFEL, GEORGE F. See CONROY, CONDER.
 WOLFERTH, CHARLES C., CHAMBERLAIN, RICHARD H., and MEAD, JOHN J.: Radioactive iodine in the treatment of angina pectoris (ab), March, 477
 WOLFGAST, G. F., and STAMPFLI, W. P.: Cholelithotomy following perforation of duodenal ulcer. Treatment by subtotal gastrectomy (ab), June, 904
 WOUNDS
 —bullet tract in lung (ab), R. Pohl, Jan., 135
 WRENN, FRANK R., Jr. See BLOOR, BYRON M.
 WRIGHT, K. A. See EVANS, W. W.
 WRIST
 See also Semilunar Bone
 —calcareous tendinitis of flexor carpi ulnaris (ab), Alexander P. Aitken and H. Kelvin Magill, Feb., 306
 —fissure formation in the navicular bone as post-traumatic pseudarthrosis (ab), H. Gieseking, April, 617
 WU, JACK FOY, and NEPTUNE, WILFORD B.: Pneumothorax as a complication of pneumoperitoneum (ab), April, 603
- X
- XANTHOMA
 —xanthomatous joint tumors (ab), W. L. Minear, March, 461
 XANTHOMATOSIS
 —diabetes insipidus with honeycomb lungs: presumed normo-cholesteremic xanthomatosis (ab), A. A. G. Lewis and J. Smart, Jan., 134
- Y
- YALOW, R. S. See WISHAM, L. H.
 YASKIN, H. EDWARD. See ALPERS, BERNARD J.
 YELIN, GABRIEL. See GROSS, ROBERT J.
 YERUSHALMY, J. See GARLAND, L. H.
 YETTER, MAURICE, and STARR, PAUL: Polyostotic fibrous dysplasia associated with hyperthyroidism (ab), Feb., 303
 YOUNG, MAURICE D., and GRISWOLD, HERBERT E.: Situs inversus of the abdominal viscera with levocardia. Report of eight cases submitted to the Blalock-Taussig operation (ab), Jan., 136
- Z
- ZATUCHNI, JACOB, AEGERTER, ERNEST E., MOLTHAN, LYNDALL, and SHUMAN, CHARLES R.: Heart in progressive muscular dystrophy (ab), May, 767
 ZAUNBAUER, W.: Widening of the septum pellucidum (ab), April, 597
 ZELLIS, ALLAN. See TERRAFRANCA, RAYMOND J.
 ZELMAN, SAMUEL: Liver and spleen visualization by a simple roentgen contrast method (ab), Jan., 144
 ZEMAN, FREDERICK D., and SCHENK, MAX: Clinical diagnosis of arteriosclerosis in the aged, with particular reference to interpretation of roentgen findings (ab), June, 910
 ZIEROLD, ARTHUR: Operating room cholangiograms (ab), April, 610
 ZIMMERMAN, H. A. See MARKS, MATTHEW O.
 ZINC, RADIOACTIVE. See Radioactivity
 ZINN, WILLARD J., LEVINSON, DAVID C., JOHNS, VARNER, and GRIFFITH, GEORGE C.: Effect of angiocardiology on the heart as measured by electrocardiographic alterations (ab), April, 604
 ZIPERMAN, H. HASKELL, HUGHES, RICHARD R., and SHUMACKER, HARRIS B., Jr.: Effect of barbiturates and other drugs on mortality from diodrast in the mouse (ab), Feb., 311
 ZISKIND, JOSEPH. See DERMAN, HERBERT
 ZOLLINGER, HANS U.: Does Joduron bronchography damage the lung parenchyma? Contribution to the pathogenesis of granulomatous changes and xanthomatous and interstitial pneumonia in primary lung processes (ab), May, 758
 ZORINI, A., OMODEI, and PIGORINI, LUIGI: Bronchiectatic bronchiolitis (ab), May, 765
 ZSEBÖK, Z., KOZMA, T., and LÁNG, B.: On the relationship between the excretion of sodium tetraiodophenolphthalein and non-opacification of the gallbladder (ab), April, 609
 —See KOKAS, F.
 ZUCKNER, JACK. See PARISER, SANFORD
 ZÜST, G. E. See WILK, S.
 ZUPPINGER, A.: Biological problems in x-ray therapy of intrinsic and extrinsic tumours of the larynx (ab), June, 913
 ZWANGER, JEROME. See BELL, A. L. L.
 ZWERLING, H. B. See GARLAND, L. H.

June 1952

J.: Con-
om human

HARD H.,
the treat-
choledochal
enal ulcer,
904

Alexander
-traumatic
Pneumo-
eum (ab),

March, 461
ed normo-
wis and J.

otic fibrous
Feb., 303
BERT E.:
evocardia,
ck-Taussig

OLTHAN,
Heart in
dum (ab),

D J.
by a simple
nical diag-
nular refer-
June, 910
rams (ab),

NS, VAR-
of angio-
ctrocardio-

D R., and
arbiturates
the mouse

aphy dam-
the patho-
matous and
esses (ab),

nchiectatic

relationship
olphthalein
April, 609

herapy of
ab), June,